The products introduced in this catalog are all covered by ISO 9001 and 9002 certification awarded KITZ Corporation, KITZ Corporation of Europe, S.A. and KITZ Corporation of Taiwan.
**Design and Inspection Standards of KITZ Flanged Ball Valves**

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*1 Option

**Design and Inspection Standards of KITZ Threaded Ball Valves**

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*1 Except AKSTKM (50), AKUTKM (52) and AKUTHM (53) which are KITZ standard

**Product Coding for KITZ Flanged Ball Valves**

Example: 150 G 150 U T A M (C) 150 SC T TDZ M - FS

1. Valve operation measure
   - None ... Lever handle
   - G ...... Worm gear
   - E ...... Electric actuator
   - B ...... KITZ Type B double action pneumatic actuator
   - BS ...... KITZ Type BS spring return pneumatic actuator
   - FA ...... KITZ Type FA double action pneumatic actuator
   - FAS ...... KITZ Type FAS spring return pneumatic actuator

2. ASME pressure class
   - 150, 300, 600 or 1500

3. Shell material
   - SC ...... Carbon or low alloy steel
   - U ...... Stainless or high alloy steel
   - V ...... CF3
   - A ...... Single Reduced Bore, uni-body with ISO / CAPI actuator mounting pad
   - H ...... Single Reduced
   - F ...... Full

4. Shell material
   - M ...... CF8M
   - BL ...... LCB
   - O ...... CF3M
   - CL ...... LCC

5. Symbol for ball valves
   - DZ ...... Full Bore, split body with ISO / CAPI actuator mounting pad
   - B ...... Full Bore, split body with KITZ actuator mounting pad
   - A ...... Single Reduced Bore, uni-body with ISO / CAPI actuator mounting pad

6. Trim material for carbon steel valves
   - No symbol for 304 s/s trim.
   - "M" for 316 s/s trim.
   - "FS" For Flexible graphite packing and gasket for super-fire-safe provision in accordance with API607
   - No symbol for PTFE packing gasket.

7. "(C)" For CAPI Configuration of Single Reduced Bore

**Product Coding for KITZ Threaded Ball Valves**

Example: AK SC T K Z M - FS O

1. End connection
   - AK ........ Tapered NPT (ASME B1.20.1)
   - AW ........ Socket Weld (ASME B16.11)
   - BW ........ Butt weld (ASME B16.25)
   - AK/AW .... Threaded x Socket Weld

2. Shell material
   - SC ...... Carbon Steel
   - U ...... Stainless Steel

3. Valve Type
   - T ...... Floating Ball
   - 3T ...... 3-PC

4. Bore design
   - K ...... Double Reduced
   - H ...... Single Reduced
   - F ...... Full

5. Mounting pad
   - Z ......... Integral (ISO-S211 on 3-pc)
   - M ......... 316SS

6. Trim (Ball and stem)
   - L .............. Locking Lever
   - O .............. Locking Oval

7. Special Features
   - W .............. Seal Welded
   - AK .............. Tapered NPT (ASME B1.20.1)
   - AW .............. Socket Weld (ASME B16.11)
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*Note: Full, Reduced, Single, Cryogenic, Double Reduced, Screwed, WOG, ASME B16.5, ASME 1.20.1, Fire Safe per API607, Anti-Static Device, A105, A216 Gr.WCB*
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KITZ 150 / 300 SCTDZM / UTDZM Series
Full Bore, Split Body, Side Entry Ball Valves

This is an illustrated cross-section of a typical KITZ full port, split body, floating type ball valve to exhibit the basic design concept. The actual design of a valve may be slightly different from this illustration, depending on its size and pressure class.

Bubble-tight sealing performance with HYPATITE® ball seats

HYPATITE® ball seats, standard stem seals of KITZ ball valves, are made of denatured PTFE, a molecularly reinforced PTFE copolymer, and specifically engineered for high bi-directional sealing performance and prolonged service life of valves. Its resistance to high or low temperatures, creep or compression, abrasion and corrosion is all outstanding. As an option, KITZ SWELLESS® ball seats principally made of PFA are recommended specifically for monomer service. This epoch-making new seat maximizes resistance to the permeation of monomer into its molecular structure (generally known as a “swelling” problem) which causes seat deformation and seriously affects shut-off function of valves in styrene and butadiene monomer service.

Simplified actuator mounting

For 150 / 300 SCTDZ / UTDZM and ACTA / UTAM Series ball valves, ISO 5211 actuator mounting pad is integrally provided for uniformly simplified mounting of any actuators provided with valve mounting flanges designed to ISO 5211 dimensional requirement. Mounting pad and stem meet CAPI standard.

Easy maintenance

Split body design for KITZ SCTDZM / UTDZM Series provides the convenience of very easy maintenance critically required for process plants. Body inserts of uni-body, end entry design for KITZ 150 / 300 SCTAM (C) / UTAM (C) Series are threaded into the valve body with provision of unthreading for valve disassembly in case of maintenance operation.
This is an illustrated cross-section of a typical KITZ regular port, uni-body, floating type ball valve to exhibit the basic design concept. The actual design of a valve may be slightly different from this illustration, depending on its size and pressure class.

**Extensive safety considerations**

KITZ ball valves are designed with extensive safety considerations for users. Blow-out proof stems, Secure OPEN and CLOED locking devices and prevention of misalignment of lever handles provide safe handling in the field and trouble-free operation in the plant. Antistatic devices, firesafe seal design and cavity pressure relief features all assure the economic benefits of smooth, steady plant operation. KITZ advancements in low emission design features contribute to the global battle against fugitive emissions while greatly reducing costs caused by product loss.

**For sour service**

Hardness of body, body cap/insert, ball and stem material of KITZ Class 150/300 steel ball valves are controlled by appropriate heat treatment and conformed to the hardness requirements in NACE MR0103, as standard. In addition to the above, following requirements are optionally available.
- Bolting for valves exposed to sour environment.
- NACE requirements for Class 600 and higher steel ball valves.
Please contact KITZ for those requirements.
Seven Safety Considerations for KITZ 150 / 300 SCTDZM (C) / UTDZM (C) and 150 / 300 SCTAM (C) / UTAM (C) Series Ball Valves

1. Double "D" stem head design provides mounting of the lever handle always in parallel to the flow passage. Misalignment of the handle is thus prevented. (Fig. 1)

2. The lower end of the stem is designed with an integral collar to be blowout-proof. It also functions as the backseat for assured stem sealing. (Fig. 2)

3. An antistatic feature is provided to ensure electrical continuity between ball, stem, and body. (Fig. 2)

4. Facility for mounting a locking device for prevention of accidental valve operation is provided.

5. Plant fires are a serious concern for soft-seated ball valves because of possible fluid leakage and consequent increase of the fire magnitude caused by deterioration of resilient sealing materials.

KITZ ball valves are engineered for fire safety and successfully fire tested to minimize both external and internal fluid leakage after plant fires. They have post-fire metal-to-metal contact of all sealing areas such as:

- Contact between ball and valve shell (Fig. 3 & 4)
- Contact between stem and valve shell (Fig. 5 & 6)
- Valve shell coupling flanges of split body design (Fig. 7 & 8)
- Contact between valve body and insert of uni-body design (Fig. 9)

The problem of external fluid leakage is more serious than internal leakage through the valve bore because of the fear of fueling the fire. To prevent this, KITZ ball valves may be ordered with flexible graphite packing and gaskets, which are extremely heat resistant, and not affected by the fire. For details, refer to Page 145 and 146.

6. The surface of stem and stuffing box, and interface clearance of stem-to-gland, stem-to-stem bearing and gland-to-stuffing box are precision controlled on machining and assembly for low emission service. Materials and design of PTFE or flexible graphite packing and gasket are also carefully selected to minimize leakage of line fluid into the atmosphere. Refer to Page 145 and 146 for more information.

7. A provision for cavity pressure relief is incorporated into the precision engineered KITZ HYPATITE® PTFE ball seats for the ultimate safety. Refer to Page 10 for details.

As the primary body seal, emission free PTFE gasket is always provided. A Flexible graphite gasket is used as a secondary body seal for firesafe provision.
ISO 5211 Actuator Mounting Pads

KITZ 150 / 300 SCTDZM / UTDZM Series and 150 / 300 SCTAM (C) / UTAM (C) Series ball valves are furnished with an integral actuator mounting pad designed and factory-drilled according to ISO 5211 specification. This easily and uniformly enables mounting of any actuators provided with ISO 5211 valve mounting flanges. Mounting pad also conforms to CAPI design standard.

Note: Customers are requested to prepare mounting brackets and connectors for the actuators chosen for their valve automation. Actuators can be mounted on KITZ ball valves without disassembly of valve glands.

HYPATITE® PTFE Ball Seats

KITZ ball valves are furnished, as the manufacturer’s standard, with HYPATITE® PTFE ball seats made of denatured PTFE, a molecularly reinforced PTFE copolymer, and specially engineered for high performance which include:

A typical HYPATITE® PTFE seat used for 4” KITZ 150 SCTDZM ball valves.

Optional Ball Seats

In addition to the standard HYPATITE® PTFE ball seats, SWELLESS® PFA seats are recommended for monomer service. Also virgin PTFE and carbon filled PTFE seats are optionally available for versatility in service applications.

Cavity Pressure Relief

Some line fluid is usually left trapped inside the ball-body cavity. This fluid can expand under the influence of high ambient or line temperature. An abnormal increase in cavity pressure can damage the valve seats or balls, unless the valve has an adequate cavity pressure relief provision. Trunnion mounted ball valves provide protection from this problem with standard seat configuration. Refer to KITZ Cat. No. K-202 for technical details of KITZ trunnion mounted ball valves.

In case of floating ball valves, however, their rather simple seating principle requires some special protection from excessive cavity pressure rise when highly volatile liquid service is subject to frequent and large temperature variation, while the valve is not frequently operated. KITZ 150 / 300 SCTDZM / UTDZM and 150 / 300 SCTAM (C) / UTAM (C) Series ball valves offer self-relieving of excessive cavity pressure as a standard feature engineered in HYPATITE® ball seats.

Other general solutions for floating ball valves include employment of automatic pressure relief valves or drilling pressure equalization holes on the ball. If the requirement of automatic cavity pressure relief is as critical as in chlorine service, be sure to contact KITZ Corporation or its distributors for technical advice.
KITZ high engineered sealing design achieves superior fugitive emission performance. 
ISO 15848-1 qualified.

KITZ precise laboratory tests and various field experiences achieve the optimized new stem sealing design for superior fugitive emission performance. That is proven on the certificate of ISO 15848-1 Tightness Class BH qualification test, witnessed by Bureau Veritas. This is KITZ standard specification for Class 150 and 300 flanged floating ball valves, identified as 150 / 300 UTDZ / SCTDZ Series (split body, side entry design) in this catalog.

**ISO 15848-1 Qualification**

<table>
<thead>
<tr>
<th>Class</th>
<th>Series</th>
<th>Seat</th>
<th>Packing</th>
<th>Gasket</th>
<th>Tightness Class</th>
<th>Temperature Class</th>
<th>Endurance Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>150</td>
<td>UTDZ</td>
<td>HYPATITE® PTFE</td>
<td>PTFE</td>
<td>B *1</td>
<td>-29°C<del>200°C (-20°F</del>392°F)</td>
<td>CO 3 *2</td>
<td></td>
</tr>
<tr>
<td>300</td>
<td>UTDZ-FS</td>
<td>HYPATITE® PTFE</td>
<td>Flexible Graphite</td>
<td>B *1</td>
<td>-29°C<del>200°C (-20°F</del>392°F)</td>
<td>CO 3 *2</td>
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</tbody>
</table>

*1 ISO 15848-1 remarks that tightness class A typically achieved with bellows seal, class B with PTFE packing and class C with flexible graphite packing.

*2 CO 3 includes 2,500 cycle operation and 4 times thermal cycle.

**CAA / EPA Method 21 (40 CFR. 60 Appendix A)**

The US Federal Clean Air Act requires all plants handling the toxic gases and chemicals listed by the Environmental Protection Agency (EPA) to periodically monitor their plant equipment for detection of fugitive emissions exceeding criteria, and repair or replace all defective equipment immediately.

The criteria of emission are categorized in detail by the emission sources (equipment) and/or listed fluid type. Some state regulations, such as California, require more stringent emission control that is reaching 50 ppm maximum leak level.

KITZ low emission service ball valves are designed, engineered, manufactured and tested to meet these emission level as standard product for KITZ 150 / 300 UTDZ / SCTDZ and UTAM(C) / SCTAM(C)*2 Series Ball Valves.

Our low emission valve performance and laboratory test results are shown on the below table*1.

**Laboratory Test Results**

<table>
<thead>
<tr>
<th>Class</th>
<th>Body Type</th>
<th>Series</th>
<th>Seat</th>
<th>Packing</th>
<th>Maximum leak level on new valve</th>
<th>Test result after 10,000 cycle operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>150</td>
<td>Split-body</td>
<td>UTDZ</td>
<td>HYPATITE® PTFE</td>
<td>PTFE</td>
<td>20ppm</td>
<td>50ppm *3</td>
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<tr>
<td>300</td>
<td>UTDZ-FS</td>
<td>HYPATITE® PTFE</td>
<td>Flexible Graphite</td>
<td>50ppm</td>
<td>50ppm *3</td>
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</table>

*1 Maximum leak level guaranteed for the duration of the KITZ warranty in North America for emission monitoring with EPA Method 21 procedures and methane-calibrated organic vapor analyzers.

*2 Except 1” and smaller sizes, which are provided with only one piece of packing ring due to limited stuffing box dimension.

*3 Maximum leak level was measured with clean fluid at ambient room temperature, and with adequate gland bolts retightening according to KITZ maintenance manual.
Major design considerations for having upgraded our standard valves to the low emission performer are introduced below:

**Diametrical interface clearance**

The diametrical clearance is strictly controlled to prevent the line fluid from leaking into the atmosphere through these potential leak paths.

The optimum diametrical clearance is realized on the following area by high precision machining.

- Gland and Stem
- Gland and Stuffing Box
- Stem and Bearing

**Stem**

The stem surface finish is controlled according to KITZ design and manufacturing standards. This specification is particularly important for flexible graphite packing, because, while the stem travels through the packing rings, graphite tends to fill micro scratches on the stem surface and migrates to the stem to function as a lubricant. Too fine a stem smoothness loses this advantage and can increase leakage. The stem straightness and roundness are also controlled according to our design and manufacturing standards.

**Stuffing box**

The surface finish is according to KITZ design and manufacturing standards. Contrary to the stem, the stuffing box wall statically contacts packing rings, and a reasonably rougher surface finish results in a better sealing performance. The cylindricity and verticality are precision controlled according to KITZ design and manufacturing standards.

**Gasket**

PTFE gasket is used for standard version. Graphite gasket is used for the optional fire safe version and high temperature low emission service respectively. The gasket contact faces of valve shells are precision machined to further upgrade the sealing function of the valve shell joint.

**Gland packing**

A conventional type of die formed packing ring is entirely made of many layers of vertically wrapped graphite tape. Interlayer and through-graphite permeation of line fluid in the vertical axis direction is rather an inherent problem on the conventional type of die formed packing rings.

To solve this problem, a unique design is employed on the KITZ Graphite Packing Rings for Low Emission Service. Vertically and horizontally wrapped graphite tapes are securely fixed into the ring structure of KITZ Graphite Packing Rings for Low Emission Service, as shown in Fig (*)

**Kitz General Term of Warranty for Low Emission Service Valves**

**Warranty Period**

12 months after placement in service, but not exceeding 18 months after shipment from KITZ factories.

**Warranty Conditions**

1. Proper storage and maintenance of valves prior to installation, according to the KITZ maintenance manual.
2. Proper handling of valves during transportation and plant construction, which includes sandblasting and painting, for protection of exposed stems and glands of valves.
3. Need of adequate retightening of gland packing sets* according to the KITZ maintenance manual to reduce the leak level, when an excessive level of fugitive emission is detected during:
   a) Pre-installation valve inspection
   b) Process pilot run or start-up operation
   c) Periodic or occasional inspection of valves in service
4. Valve stems must be kept free of scratches, scars or corrosion.
5. Following all other instructions provided in the KITZ maintenance and operation manuals.

* This condition is particularly important when valves are subjected to thermal cycles on the site. Users are recommended to ensure that packing is retightened after every cool-down of the process.
The pressure-temperature ratings of ball valves are determined, not only by valve shell materials, but more essentially by sealing materials used for ball seats, gland packing and gaskets. Sealing materials may be high molecule plastics or rubbers, but the choice is limited by the characteristics of the service fluid, working temperatures, working pressures, velocity of fluid, and operational frequency of valves.

As it is very difficult to predetermine the exact pressure-temperature rating for all kinds of fluid under all imaginable conditions, we have prepared general rating charts for non-shock fluid service here, based on our past experiences both in the field and in our laboratory. In case of extraordinary service conditions as mentioned below, contact KITZ Corporation or its distributors for technical advice:

1. Valves shall be left fully closed for a long period of time under high temperature or high differential pressure.
2. Valves shall be frequently operated under high temperature or high differential pressure.
3. Frequent change of line pressure or temperature.

Seat materials A: Virgin PTFE B: HYPATITE® PTFE, Carbon-filled PTFE, or SWELLESS®. HYPATITE® is the standard seat material for KITZ ball valves. Specify virgin PTFE or carbon-filled PTFE when required. The body pressure ratings shown here are for ASTM A216 Gr. WCB. For the pressure ratings of other valve shell materials, refer to the latest edition of ASME B16.34.

Note*: Continuous service in high differential pressure exceeding 580psig for these valves may cause ball seat degradation or shortening life. Trunnion mounted ball valve would be recommended for following services.

1) Alternate pressurization from both valve end exceeding 580psig
2) Both high(exceeding 580psig) and low(less than 145psig) pressure tight shut off required services.
3) Frequent breakaway operations over 500times under high differential pressure exceeding 580psig.
Seat materials
rating for all kinds of fluid under all imaginable conditions, we have
As it is very difficult to predetermine the exact pressure-temperature
frequency of valves.

temperatures, working pressures, velocity of fluid, and operational
limited by the characteristics of the service fluid, working
only by valve shell materials, but more essentially by sealing
The pressure-temperature ratings of ball valves are determined, not
ratings of other valve shell materials, refer to the latest edition of ASME B16.34.

Pressure-Temperature Ratings

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3. Frequent change of line pressure or temperature.
Valves shall be frequently operated under high temperature or

1. Contact KITZ Corporation or its distributors for technical advice:
In case of extraordinary service conditions as mentioned below,
presented general rating charts for non-shock fluid service here, based
high differential pressure.

2) Both high (exceeding 580 psig) and low (less than 145 psig) pressure tight shut off
required services.

1) Alternate pressurization from both valve end exceeding 580 psig
Continuous service in high differential pressure exceeding 580 psig for these

Note*

3) Frequent breakaway operations over 500 times under the high differential
pressure exceeding 580 psig.

Note*
**Ball Seat Materials**
1. KITZ HYMATITE or Carbon-filled PTFE
2. Glass-filled PTFE with MoS₂
3. Virgin PTFE
4. Nylon with MoS₂

**O-ring Upper Limit**
1. (FKM)
2. (Low-temperature FKM)
3. (EPDM)
4. (Eco (Epichlorohydrin Copolymer))
5. (NBR)
6. (Low-temperature NBR)

**O-ring Lower Limit**
1. FKM

*O-rings made of others than FKM can withstand -20°F.*
### MATERIAL LIST

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<td>216 B</td>
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### DIMENSIONS

**Nominal Size**

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<th>H</th>
<th>D1</th>
<th>L</th>
<th>D</th>
<th>C</th>
<th>No.</th>
<th>h</th>
<th>1/s</th>
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<th>g</th>
<th>t</th>
<th>f</th>
<th>P</th>
<th>Q</th>
<th>A</th>
<th>B</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>K</th>
<th>T</th>
<th>U</th>
<th>ISO 5211 Flange Type</th>
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<td>12</td>
<td>1.00</td>
<td>1.19</td>
<td>0.06</td>
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<td>14.29</td>
<td>1.81</td>
<td>2.36</td>
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### End Flange

- **Unit**: Inch
- **Bolt Hole**: D, C, No.
- **Bolt Size**: g, t, f, P, Q, A, B, E, F, G, K, T, U
- **ISO 5211 Flange Type**: M20, F16
Steel Ball Valves

150SCTAM (C)
150SCTAM-FS (C)

MATERIAL LIST

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of Parts</th>
<th>Materials</th>
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<tbody>
<tr>
<td>1</td>
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</tr>
<tr>
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<td>STEM</td>
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</tr>
<tr>
<td>4</td>
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<tr>
<td>7</td>
<td>GLAND</td>
<td>A276 TYPE 316</td>
</tr>
<tr>
<td>8</td>
<td>GLAND PACKING</td>
<td>150SCTAM (C)</td>
</tr>
<tr>
<td>9</td>
<td>HANDLE</td>
<td>STAINLESS STEEL</td>
</tr>
<tr>
<td>10A</td>
<td>HANDLE NUT</td>
<td>STAINLESS STEEL</td>
</tr>
<tr>
<td>16</td>
<td>NAME PLATE</td>
<td>STAINLESS STEEL</td>
</tr>
<tr>
<td>19A</td>
<td>GASKET</td>
<td>PTFE</td>
</tr>
<tr>
<td>19B</td>
<td>GASKET</td>
<td>150SCTAM-FS (C)</td>
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<tr>
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<td>BALL SEAT</td>
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<tr>
<td>43A</td>
<td>WASHER</td>
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<td>43B</td>
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<td>47</td>
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<tr>
<td>67</td>
<td>STEM BEARING</td>
<td>C/F PTFE (SIZE 1/2 &amp; 3/4)</td>
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<td>124</td>
<td>RING SPRING</td>
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<tr>
<td>126</td>
<td>STOPPER PIN</td>
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</tr>
</tbody>
</table>

NOTE

(1) All valves have an anti-static thrust washer or stem bearing insuring positive conductivity between body and stem.

(2) Dimensions A and B are in accordance with CAPI F03-S.

DIMENSIONS

<table>
<thead>
<tr>
<th>Nominal Size</th>
<th>Unit : inch</th>
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<tbody>
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<tr>
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<table>
<thead>
<tr>
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<th>End Flange</th>
<th>Mounting Dimensions for Actuator</th>
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<tr>
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class 150 cast steel ball valves
Steel Ball Valves

150SCTAM (C)
150SCTAM-FS (C)

MATERIAL LIST

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of Parts</th>
<th>Materials</th>
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<tbody>
<tr>
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<td>A216 Gr. WCB</td>
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<tr>
<td>3</td>
<td>STEM</td>
<td>A276 TYPE 316 or A479/A479M TYPE 316</td>
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<td>4</td>
<td>BALL</td>
<td>A276 TYPE 316 or A351 Gr. CF8M</td>
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<td>7 A</td>
<td>GLAND</td>
<td>A276 TYPE 316 or A479/A479M TYPE 316 (SIZE 1 1/2&quot; ONLY)</td>
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<td>7 B</td>
<td>GLAND PACKING</td>
<td>150SCTAM (C)</td>
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<td>8 A</td>
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<td>150SCTAM (C)</td>
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<td>8 B</td>
<td>GLAND PACKING</td>
<td>PTFE (SIZE 2 &amp; OVER)</td>
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<td>HANDLE</td>
<td>STAINLESS STEEL (SIZE 1 1/2&quot; ONLY)</td>
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<td>9 A</td>
<td>HANDLE BAR</td>
<td>CARBON STEEL (SIZE 6 &amp; OVER)</td>
</tr>
<tr>
<td>9 B</td>
<td>HANDLE HEAD</td>
<td>DUCTILE IRON (SIZE 6 &amp; OVER)</td>
</tr>
<tr>
<td>10 A</td>
<td>HANDLE NUT</td>
<td>STAINLESS STEEL (SIZE 1 1/2&quot; ONLY)</td>
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<tr>
<td>10 B</td>
<td>NUT</td>
<td>STAINLESS STEEL (SIZE 1 1/2&quot; ONLY)</td>
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<tr>
<td>16 A</td>
<td>NAME PLATE</td>
<td>STAINLESS STEEL</td>
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<tr>
<td>16 B</td>
<td>LEV PLATE</td>
<td>STAINLESS STEEL</td>
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<td>19 A</td>
<td>GASKET</td>
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END FLANGE MOUNTING DIMENSIONS FOR ACTUATOR

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ISO 5211 Flange Type

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<tr>
<td>1 1/2&quot;</td>
<td>1/4-18 UNC</td>
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<td>2&quot;</td>
<td>1/4-12 UNC</td>
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<td>2&quot;</td>
<td>1/4-16 UNC</td>
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DIMENSIONS

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<th>Nominal Size</th>
<th>Flange Type</th>
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<tbody>
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<td>1/4-20 UNC</td>
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Unit: inch
Steel Ball Valves

300SCTDZM
300SCTDZM-FS

MATERIAL LIST

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<th>No.</th>
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<th>Materials</th>
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<tr>
<td>2</td>
<td>BODY CAP</td>
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<tr>
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<td>4</td>
<td>BALL</td>
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<tr>
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<td>11</td>
<td>HANDLE HEAD</td>
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<td>HANDLE BOLT</td>
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<tr>
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<td>SPRING &amp; PIN</td>
<td>A313 &amp; A276 TYPE316</td>
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<td>STOPPER PLATE BOLT</td>
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<td>CE PLATE</td>
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<td>ATEX PLATE</td>
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DIMENSIONS

<table>
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<tr>
<th>Nominal Size</th>
<th>Bolt Hole</th>
<th>End Flange</th>
<th>Mounting Dimensions for Actuator</th>
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Unit: inch

class 300 cast steel ball valves
### MATERIAL LIST

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<th>Name of Parts</th>
<th>Materials</th>
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<tbody>
<tr>
<td>1</td>
<td>BODY</td>
<td>A216 Gr. WCB</td>
</tr>
<tr>
<td>3</td>
<td>STEM</td>
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<td>8</td>
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<td>WASHER</td>
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<td>43B</td>
<td>CONED DISC SPRINGS</td>
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</tr>
<tr>
<td>47</td>
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<tr>
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<td>STOPPER PIN</td>
<td>STAINLESS STEEL</td>
</tr>
</tbody>
</table>

**NOTE**

(1) All valves have an anti-static thrust washer or stem bearing insuring positive conductivity between body and stem.

(2) Dimensions A and B are in accordance with CAPI F03-S.

### DIMENSIONS

#### Nominal Size

<table>
<thead>
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<th>Nominal Size</th>
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<th>d</th>
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<th>H</th>
<th>D1</th>
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<th>h</th>
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<th>g</th>
<th>t</th>
<th>f</th>
<th>A</th>
<th>B</th>
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<th>G</th>
<th>K</th>
<th>T</th>
<th>U</th>
<th>ISO 5211 Flange Type</th>
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**Unit:** inch

---

**Steel Ball Valves**

**300SCTAM (C)**

**300SCTAM-FS (C)**
**300SCTAM (C)**

**300SCTAM-FS (C)**

---

**MATERIAL LIST**

<table>
<thead>
<tr>
<th>No.</th>
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<th>Materials</th>
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<tr>
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<td>GLAND PACKING</td>
<td>300SCTAM-FS (C)</td>
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<tr>
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<td>HANDLE BAR</td>
<td>CARBON STEEL (SIZE 6 &amp; OVER)</td>
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<td>9 B</td>
<td>HANDLE HEAD</td>
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<td>LEV PLATE</td>
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<td>A105N (SIZE 3–6)</td>
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**DIMENSIONS**

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<tr>
<th>Nominal Size</th>
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<th>End Flange</th>
<th>Mounting Dimensions for Actuator</th>
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<td>D C No. h</td>
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<td>5.06 7.50 6.12</td>
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<td>5.00 0.87 0.67 1.27 1.34 0.08 ½-20UNC F14</td>
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**Materials**

- **PTFE**: (SIZE 1½ ONLY)
- **FLEXIBLE GRAPHITE**: (SIZE 1½ ONLY)
- **STAINLESS STEEL**: (SIZE 1½ ONLY)
- **CARBON STEEL**: (SIZE 6 & OVER)
- **DUCTILE IRON**: (SIZE 6 & OVER)
- **REINFORCED PTFE**: (SIZE 1½ ONLY)

---

**Flange Type**

- **F05**: ½-20UNC
- **F07**: ½-20UNC
- **F10**: ½-20UNC
- **F12**: ½-20UNC
- **F14**: ½-20UNC
- **F16**: ½-20UNC

---

**Unit**: inch
Steel Ball Valves

600SCTBM
600SCTBM-FS

NOTE

(1) Zinc plating.

DIMENSIONS

Nominal Size  Unit : inch

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<th>mm</th>
<th>d</th>
<th>H</th>
<th>D1</th>
<th>L</th>
<th>D</th>
<th>C</th>
<th>No.</th>
<th>h</th>
<th>Bolt Size</th>
<th>g</th>
<th>t</th>
<th>f</th>
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<td>5.12</td>
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<tr>
<td>5/8</td>
<td>0.75</td>
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<td>5.12</td>
<td>7.50</td>
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<td>4</td>
<td>0.75</td>
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<td>1.69</td>
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<tr>
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<td>1.25</td>
<td>5.12</td>
<td>6.30</td>
<td>8.50</td>
<td>4.88</td>
<td>3.50</td>
<td>4</td>
<td>0.75</td>
<td>1/4</td>
<td>2.00</td>
<td>0.69</td>
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<td>1 1/4</td>
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1500SCTBM
1500SCTBM-FS

### MATERIAL LIST

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<td>2</td>
<td>BODY CAP</td>
<td>A216 Gr. WCB</td>
</tr>
<tr>
<td>3</td>
<td>STEM</td>
<td>A276 TYPE 316</td>
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<tr>
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<td>BALL</td>
<td>A276 TYPE 316</td>
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<tr>
<td>5</td>
<td>GLAND</td>
<td>A351 Gr. CF8</td>
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<td>GLAND PACKING</td>
<td>1500SCTBM-PTE</td>
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<td>HANDLE</td>
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<tr>
<td>8</td>
<td>GASKET</td>
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<td>MoS2 NYLON</td>
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**NOTE**

(1) Zinc plating.

### DIMENSIONS

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<th>Unit: inch</th>
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<tbody>
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<td>in.</td>
<td>mm</td>
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</tr>
<tr>
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**End Flange**

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Steel Ball Valves

G-150UTDZM

MATERIAL LIST

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<th>Materials</th>
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<tr>
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DIMENSIONS

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ISO 5211 Flange Type

class 150 cast stainless steel ball valves
150UTAM (C)
150UTAM-FS (C)

MATERIAL LIST

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<th>No.</th>
<th>Name of Parts</th>
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NOTE
(1) All valves have an anti-static thrust washer or stem bearing insuring positive conductivity between body and stem.
(2) Dimensions A and B are in accordance with CAPI F03-S.

DIMENSIONS

Unit : inch

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<th>( \frac{3}{4} )</th>
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End Flange

Mounting Dimensions for Actuator
Steel Ball Valves

150UTAM (C) 150UTAM-FS (C)

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Unit: inch
# Steel Ball Valves

## 300UTDZM
### 300UTDZM-FS

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</table>
Steel Ball Valves

### 300UTAM (C)

#### 300UTAM-FS (C)

**Materials:**
- **No.** Name of Parts | Materials
- 1  BODY | A351 Gr. CF8M
- 3  STEM | A276 TYPE 316
- 4  BALL | A276 TYPE 316
- 7  GLAND | A276 TYPE 316
- 8  GLAND PACKING | 300UTAM (C)
- 9  HANDLE | STAINLESS STEEL
- 10 A  HANDLE NUT | STAINLESS STEEL
- 16  NAME PLATE | STAINLESS STEEL
- 19 A  GASKET | PTFE
- 19 B  GASKET | 300UTAM-FS (C)
- 29  INSERT | A351 Gr. CF8M
- 30  BALL SEAT | HYMATTE PTFE
- 40  KEY LOCK PLATE | STAINLESS STEEL
- 43 A  WASHER | STAINLESS STEEL
- 43 B  CONED DISC SPRINGS | STAINLESS STEEL
- 47  THRUST WASHER | C/F PTFE (SIZE 1 ONLY)
- 67  STEM BEARING | C/F PTFE (SIZE 1/2 & 1/4)
- 124  RING SPRING | STAINLESS STEEL
- 126  STOPPER PIN | STAINLESS STEEL

**NOTE**
1. All valves have an anti-static thrust washer or stem bearing insuring positive conductivity between body and stem.
2. Dimensions A and B are in accordance with CAPI F03-S.

**Dimensions**

<table>
<thead>
<tr>
<th>Nominal Size</th>
<th>Unit</th>
<th>Bolt Hole</th>
<th>End Flange</th>
<th>Mounting Dimensions for Actuator</th>
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<tr>
<td>in.</td>
<td>mm</td>
<td>d</td>
<td>d1</td>
<td>H</td>
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<td>25</td>
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<td>0.67</td>
<td>3.94</td>
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Steel Ball Valves (Cryogenic or Cold Service)

**150UTALM**

### MATERIAL LIST

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<tr>
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<td>2 B</td>
<td>BONNET</td>
<td>A276 TYPE 316 or A479 TYPE 316</td>
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<tr>
<td>3</td>
<td>STEM</td>
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<td>4</td>
<td>BALL</td>
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| 7   | GLAND         | A276 TYPE 316 or A479 TYPE 316 (SIZE 1½-11"
|       |               | or A479 TYPE 316 (SIZE 2 ONLY) |
| 8   | HANDLE PACKING| A351 Gr. CF8M or A276 TYPE 316 (SIZE 2 ONLY) |
| 9   | HANDLE        | STAINLESS STEEL |
| 16  | NAME PLATE    | STAINLESS STEEL |
| 19 A| GASKET        | PTFE |
| 19 B| GASKET        | FLEXIBLE GRAPHITE |
| 19 C| GASKET        | |
| 29  | INSERT        | A182 Gr. F316 (SIZE 1½-1"
|       |               | or A479 TYPE 316 |
| 30  | BALL SEAT     | HYPATITE PTFE |
| 33  | BONNET NUT    | A194 Gr. 8M |
| 34  | GLAND NUT     | STAINLESS STEEL |
| 35  | BONNET BOLT   | A320 Gr. 8M |
| 36  | GLAND BOLT    | A193 Gr. 8M |
| 40 A| LOCK PLATE    | STAINLESS STEEL |
| 40 B| LOCK PLATE    | STAINLESS STEEL |
| 43  | CONED DISC SPRINGS | STAINLESS STEEL (SIZE 1½-1"
|       |               | or A479 TYPE 316 |
| 48  | SNAP RING     | STAINLESS STEEL |
| 49  | STOPPER       | STAINLESS STEEL |
| 47  | STEM BEARING  | C/F PTFE (S) (UP TO SIZE 1) |
|     |               | G/F PTFE (SIZE 1½" & OVER) |
| 87  | PIPE          | A512 TYPE 316 |
| 123 | HANDLE BOLT   | STAINLESS STEEL |
| 124 A| SPRING & PIN | A313 & A276 TYPE 316 |
| 124 B| RING SPRING  | A276 TYPE 316 (UP TO SIZE 1) |
| 126 | STOPPER PIN   | STAINLESS STEEL |
| 145 | SPRING WASHER| STAINLESS STEEL |
| 216 | PRESSURE DIRECTION PLATE | STAINLESS STEEL |
|      | VENT HOLE SIDE PLATE | STAINLESS STEEL |

**NOTE**

1. Flexible graphite cored PTFE braided packing + flexible graphite packing.
2. Plastic covering.
3. Flexible graphite spiral wound.
4. Please install valve so that the arrow indicated should be in the above direction.
5. Valves have an anti-static stem bearing insuring positive conductivity between body and stem.
6. Dimensions A and B are not in accordance with ISO 5211.

### DIMENSIONS

| Nominal Size | Unit (mm) | D | d1 | D1 | L | D | C | No. | h | Bolt Hole | g | t | f | A | B | E | F | G | K | T | U | ISO 5211 | Flange Type | H | W1 |
|--------------|-----------|---|----|----|---|---|---|----|----|-----------|---|---|---|---|---|---|---|---|---|---|-----------|-------------|---|---|
| 1/8          | 15        | 0.49| 0.39| 5.51| 4.25| 3.50| 2.38| 4 | 0.62| 1/2 | 1.38 | 0.44 | 0.06 | 0.28 | 0.39 | 0.99 | 1.42 | 0.35 | 0.67 | 0.06 | 1/2-20UNC | F03 (6) | 12.28 | 8.86 |
| 1/4          | 20        | 0.75| 0.69| 5.51| 4.62| 3.88| 2.75| 4 | 0.62| 1/2 | 1.69 | 0.44 | 0.06 | 0.28 | 0.39 | 0.99 | 1.42 | 0.35 | 0.67 | 0.06 | 1/2-20UNC | F03 (6) | 12.36 | 8.86 |
| 1            | 25        | 0.98| 0.67| 6.30| 5.00| 4.25| 3.12| 4 | 0.62| 1/2 | 2.00 | 0.44 | 0.06 | 0.43 | 0.55 | 0.55 | 1.18 | 1.65 | 0.51 | 1.02 | 0.06 | 1/2-20UNC | F04 | 10.55 | 8.00 |
| 1 1/2        | 40        | 1.50| 1.18| 7.09| 6.50| 5.00| 3.88| 4 | 0.62| 1/2 | 2.88 | 0.56 | 0.06 | 0.55 | 0.71 | 0.71 | 1.38 | 1.97 | 0.55 | 1.26 | 0.08 | 1/2-20UNC | F05 | 15.94 | 10.98 |
| 2            | 50        | 2.00| 1.50| 9.06| 7.00| 6.00| 4.75| 4 | 0.75| 1/4 | 3.62 | 0.62 | 0.06 | 0.67 | 0.87 | 2.17 | 2.76 | 0.67 | 1.34 | 0.08 | 1/4-18 UNC | F07 | 16.57 | 11.42 |

**Unit**: inch

1/24 1/16 1/8 1/4 1 1 1/8 5/8 3/4 1 1 1/4 1 1/2 2 2 1/2 3 4 5 6 7 8 10

**class 150 cryogenic cast stainless steel ball valves**

034
**Steel Ball Valves**

**150UTALM**

### Nominal Size

- **4 mm**
- **8 mm**

### Flange Type

ISO 5211

### Bolt Size

- **5/8-16 UNC**
- **7/16-20 UNC**

### End Flange Mounting Dimensions for Actuator

- **A**: 2.76
- **B**: 5.12
- **C**: 1.42
- **D**: 5.12
- **E**: 3.39
- **F**: 1.81
- **G**: 1.42
- **H**: 1.06
- **I**: 0.08
- **J**: 0.08
- **K**: 0.08
- **L**: 0.08
- **M**: 0.08
- **N**: 0.08
- **O**: 0.08
- **P**: 0.08
- **Q**: 0.08
- **R**: 0.08
- **S**: 0.08
- **T**: 0.08
- **U**: 0.08
- **V**: 0.08
- **W**: 0.08
- **X**: 0.08
- **Y**: 0.08
- **Z**: 0.08

### Fixing Holes

- **A1**: 1.42
- **B1**: 1.42
- **C1**: 1.42
- **D1**: 1.42
- **E1**: 1.42
- **F1**: 1.42
- **G1**: 1.42
- **H1**: 1.42
- **I1**: 1.42
- **J1**: 1.42
- **K1**: 1.42
- **L1**: 1.42
- **M1**: 1.42
- **N1**: 1.42
- **O1**: 1.42
- **P1**: 1.42
- **Q1**: 1.42
- **R1**: 1.42
- **S1**: 1.42
- **T1**: 1.42
- **U1**: 1.42
- **V1**: 1.42
- **W1**: 1.42
- **X1**: 1.42
- **Y1**: 1.42
- **Z1**: 1.42

### Dimensions

- **Unit**: Inch

### Material List

1. **BODY**: A351 Gr. CF8M
2. **BONNET**: A276 TYPE 316 or A479 TYPE 316
3. **BONNET**: A276 TYPE 316 or A479 TYPE 316
4. **BALL**: A351 Gr. CF8M
5. **GLAND**: A351 Gr. CF8M or A276 TYPE 316 or A479 TYPE 316
6. **GLAND PACKING**: (1)
7. **HANDLE**: DUCTILE IRON
8. **NAME PLATE**: STAINLESS STEEL
9. **GASKET**: FLEXIBLE GRAPHITE
10. **INSERT**: A351 Gr. CF8M
11. **BALL SEAT**: HYPATITE PTFE
12. **BALL SEAT**: HYPATITE PTFE
13. **BONNET NUT**: A194 Gr. 8M
14. **BONNET BOLT**: A320 Gr. B8M
15. **GLAND BOLT**: A193 Gr. B8M
16. **KEY LOCK PLATE**: STAINLESS STEEL
17. **SNAP RING**: STAINLESS STEEL
18. **STOPPER**: STAINLESS STEEL
19. **STEM BEARING**: G/F PTFE
20. **PIECE**: A193 Gr. B8M
21. **STOPPER PIN**: STAINLESS STEEL
22. **SPRING & PIN**: STAINLESS STEEL
23. **SPRING WASHER**: STAINLESS STEEL
24. **PRESSURE DIRECTION PLATE**: STAINLESS STEEL

### NOTE

1. Flexible graphite cored PTFE braided packing + flexible graphite packing.
2. Flexible graphite spiral wound.
3. Please install valve so that the arrow indicated should be in the above direction.
Steel Ball Valves

G-150UTALM

Class 150 cryogenic cast stainless steel ball valves

DIMENSIONS

| Nominal Size | d  | d1 | D  | C  | No. | Bolt Size | g  | t  | f  | P  | Q  | A  | B  | E  | F  | G  | K  | T  | U  | ISO 5211 Flange Type |
|--------------|----|----|----|----|-----|-----------|----|----|----|----|----|----|----|----|----|----|----|----|-------------------|
| 6            | 1.5 | 25.91 | 15.75 | 3.15 | 15.50 | 15.75 | 7  | 0.75 | 0.06 | 3.39 | 13.39 | 1.06 | 1.20 | 3.35 | 4.92 | 1.06 | 2.05 | 0.08 | 1/4-13UNC | F12          |
| 8            | 2.0 | 28.05 | 15.94 | 3.94 | 18.00 | 21.00 | 10 | 1.00 | 1.19 | 0.06 | 5.12 | 14.37 | 1.81 | 2.36 | 5.12 | 6.50 | 1.91 | 3.07 | 0.08 | 1/4-11UNC | F14          |

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<th>H</th>
<th>H1</th>
<th>H2</th>
<th>L</th>
<th>D1</th>
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<td>2.0</td>
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<td>18.11</td>
<td>4.72</td>
<td>21.00</td>
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NOTE

(1) Flexible graphite cored PTFE braided packing + flexible graphite packing.
(2) Flexible graphite spiral wound.
(3) Please install valve so that the arrow indicated should be in the above direction.
**DIMENSIONS**

| Nominal Size | d | d1 | D1 | L | D | C | No. | h | Bolt Size | g | t | f | A | B | E | F | G | K | T | U | ISO 5211 Flange Type | H | H1 |
|--------------|---|----|----|---|---|---|-----|---|-----------|---|---|---|---|---|---|---|---|---|---|------------------|---|---|
| 1/2          | 15 | 0.49 | 0.39 | 5.51 | 5.50 | 3.75 | 2.62 | 4 | 0.62 | 1/8 | 1.38 | 0.56 | 0.06 | 0.28 | 0.39 | 0.99 | 1.42 | 0.35 | 0.67 | 0.06 | 1/4-20UNC | F03 | 12.28 | 8.86 |
| 3/8          | 20 | 0.75 | 0.49 | 5.51 | 6.00 | 4.62 | 3.25 | 4 | 0.75 | 1/8 | 1.69 | 0.62 | 0.06 | 0.28 | 0.39 | 0.99 | 1.42 | 0.35 | 0.67 | 0.06 | 1/4-20UNC | F03 | 12.36 | 8.86 |
| 1            | 25 | 0.98 | 0.67 | 6.30 | 6.50 | 4.88 | 3.50 | 4 | 0.75 | 1/8 | 2.00 | 0.69 | 0.06 | 0.43 | 0.55 | 1.18 | 1.65 | 0.51 | 1.02 | 0.06 | 1/4-20UNC | F04 | 10.55 | 8.80 |
| 11/2         | 40 | 1.50 | 1.18 | 7.09 | 7.50 | 6.12 | 4.50 | 4 | 0.88 | 1/4 | 2.88 | 0.81 | 0.06 | 0.55 | 0.71 | 1.38 | 1.97 | 0.55 | 1.26 | 0.08 | 1/4-20UNC | F05 | 15.94 | 10.98 |
| 2            | 50 | 2.00 | 1.50 | 9.06 | 8.50 | 6.50 | 5.00 | 8 | 0.75 | 1/8 | 3.62 | 0.88 | 0.06 | 0.67 | 0.87 | 2.17 | 2.76 | 0.67 | 1.34 | 0.08 | 1/4-18UNC | F07 | 16.57 | 11.42 |

**MATERIAL LIST**

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<tr>
<th>No.</th>
<th>Name of Parts</th>
<th>Materials</th>
</tr>
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<tbody>
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<td>BODY</td>
<td>A351 Gr. CF8M</td>
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<td>A276 TYPE 316 or A479 TYPE 316</td>
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<td>STEM</td>
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**NOTE**

(1) Flexible graphite cored PTFE braided packing + flexible graphite packing.

(2) Plastic covering.

(3) Flexible graphite spiral wound.

(4) Please install valve so that the arrow indicated should be in the above direction.

(5) Valves have an anti-static stem bearing insuring positive conductivity between body and stem.

**NOTE**

(1) Please install valve so that the arrow indicated should be in the above direction.

(2) Flexible graphite cored PTFE braided packing + flexible graphite packing.

(3) Plastic covering.

(4) Flexible graphite spiral wound.

(5) Valves have an anti-static stem bearing insuring positive conductivity between body and stem.
Steel Ball Valves

300UTALM

DIMENSIONS

| Nominal Size | d   | d1  | D1  | L    | D  | C  | No. | h  | Bolt Size | g  | t  | f  | A  | B  | E  | F  | G  | K  | T  | U  | ISO 5211 Flange Type | H  | H1  |
|--------------|-----|-----|-----|------|----|----|-----|----|-----------|----|----|----|----|----|----|----|----|----|----|---------------------|----|-----|
|              | mm | mm | mm | mm  | mm |    |     |    |           |    |    |    |    |    |    |    |    |    |    |                     |    |     |
| 3            | 80 | 3.00| 2.28| 15.75| 11.12| 8.25| 6.62| 8   | 0.88     | 1/4 | 5.00| 1.12| 0.06| 0.87| 1.10| 2.76| 4.02| 0.87| 1.73| 0.08| 1/4-16UNC          | F10 | 20.94| 13.27|
| 4            | 100| 4.00| 3.00| 15.75| 12.00| 10.00| 7.88| 8   | 0.88     | 1/4 | 6.19| 1.25| 0.06| 0.87| 1.10| 2.76| 4.02| 0.87| 1.73| 0.08| 1/4-16UNC          | F10 | 21.57| 13.27|

MATERIAL LIST

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<th>No.</th>
<th>Name of Parts</th>
<th>Materials</th>
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<td>BODY</td>
<td>A351 Gr. CF8M</td>
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<td>2 B</td>
<td>BONNET</td>
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<td>STEM</td>
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<td>216</td>
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NOTE

(1) Flexible graphite cored PTFE braided packing +
flexible graphite packing.

(2) Flexible graphite spiral wound.

(3) Please install valve so that the arrow indicated should be in the above direction.
### DIMENSIONS

<table>
<thead>
<tr>
<th>Nominal Size</th>
<th>Unit: inch</th>
</tr>
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### NOTE

1. Flexible graphite cored PTFE braided packing + flexible graphite packing.
2. Flexible graphite spiral wound.
3. Please install valve so that the arrow indicated should be in the same direction.
Steel Ball Valves

AKSCTKZM-FS
CODE NO. 119

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NOTE

(1) Plastic covering.
(2) Valve rating 2000WOG (Size 1/4 to 1), 1500WOG (Size 1/4 to 2)
## MATERIAL LIST

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### NOTE

1. Plastic covering.
2. Valve rating 2000WOG (size 1/4 to 1), 1500WOG (size 1/2 to 2).

## DIMENSIONS

### Unit : inch

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Steel Ball Valves

AKSCTHZM
CODE NO. 217

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NOTE

(1) Plastic covering.
(2) BS 5351 Class 800 (size 1/4 to 1), KITZ standard (size 1 1/4 to 2).
(3) Valve rating 2000WOG (size 1/4 to 1), 1500WOG (size 1 1/4 to 2).

DIMENSIONS

Unit: inch

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Steel Ball Valves

AKSCTHZM-O

CODE NO. 217-LOH

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NOTE

(1) Plastic covering.
(2) BS 5351 Class 800 (size 1/4 to 1), KITZ standard (size 1 1/4 to 2).
(3) Valve rating 2000WOG (size 1/4 to 1), 1500WOG (size 1 1/4 to 2).

DIMENSIONS

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Steel Ball Valves

AKSCTHZM-FS
CODE NO. 219

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NOTE

(1) Plastic covering.
(2) BS 5351 Class 800 (size 1/4 to 1), KITZ standard (size 1/4 to 2).
(3) Valve rating 2000WOG (size 1/4 to 1), 1500WOG (size 1/4 to 2)

DIMENSIONS

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### Steel Ball Valves

**AKSCTHZM-FSO**

**CODE NO. 219-LOH**

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**NOTE**

1. Plastic covering.
2. BS 5351 Class 800 (size 1/4 to 1), KITZ standard (size 1 1/4 to 2).
3. Valve rating 2000WOG (size 1/4 to 1), 1500WOG (size 1 1/4 to 2).

### DIMENSIONS

**Unit : inch**

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**NOTE**

1. Plastic covering.
2. BS 5351 Class 800 (size 1/4 to 1), KITZ standard (size 1/4 to 2).
3. Valve rating 2000WOG (size 1/4 to 1), 1500WOG (size 1/4 to 2).
Steel Ball Valves

AKSCTHWZM-O
CODE NO. 237-LOH

MATERIAL LIST

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NOTE

(1) Plastic covering.
(2) BS 5351 Class 800 (size 1/4 to 1), KITZ standard (size 1/4 to 2).
(3) Valve rating 2000WOG (size 1/4 to 1), 1500WOG (size 1/4 to 2).

DIMENSIONS

| Nominal Size | d   | H   | D1   | L    | d2   | S1   | P1   | P2   | E    | F    | T    |
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| 3/8          | 0.46| 2.24| 3.94 | 2.08 | NPT 3/8| 0.94 | 0.50 | 1.12 | 0.43 | 0.76 | No.10-24UNC |
| 1/2          | 0.50| 2.45| 3.94 | 2.40 | NPT 1  | 1.16 | 0.50 | 1.12 | 0.52 | 0.96 | No.10-24UNC |
| 5/8          | 0.59| 2.51| 3.94 | 2.71 | NPT 5/8| 1.38 | 0.87 | 1.37 | 0.50 | 0.93 | No.10-24UNC |
| 3/4          | 0.78| 2.63| 3.94 | 3.25 | NPT 3  | 1.69 | 0.87 | 1.37 | 0.62 | 1.19 | No.10-24UNC |
| 1            | 1.00| 2.81| 3.94 | 3.54 | NPT 1  | 2.09 | 0.93 | 1.50 | 0.61 | 1.19 | 1/4-20UNC   |
| 1 1/4        | 1.26| 3.81| 5.12 | 4.13 | NPT 1  | 2.32 | 0.93 | 1.50 | 0.86 | 1.45 | 1/4-20UNC   |
| 1 1/2        | 1.50| 4.03| 5.12 | 4.61 | NPT 2  | 2.83 | 0.93 | 1.50 | 0.83 | 1.42 | 1/4-20UNC   |

Unit: inch
Steel Ball Valves

AKSCTHWZM-FS

CODE NO. 239

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NOTE

(1) Plastic covering.
(2) BS 5351 Class 800 (size 1/4 to 1), KITZ standard (size 1/8 to 2).
(3) Valve rating 2000 WOG (size 1/4 to 1), 1500 WOG (size 1/2 to 2).

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Steel Ball Valves

AKSCTHWZM-FSO
CODE NO. 239-LOH

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NOTE
(1) Plastic covering.
(2) BS 5351 Class 800 (size 1/4 to 1), KITZ standard (size 1 1/4 to 2).
(3) Valve rating 2000WOG (size 1/4 to 1), 1500WOG (size 1 1/4 to 2).

DIMENSIONS

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Steel Ball Valves

AKSCTKM
CODE NO. 50

NOTE
(1) Phosphating.
(2) Plastic covering.

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NOTE
(1) Phosphating.
(2) Plastic covering.

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NOTE
(1) Phosphating.
(2) Plastic covering.

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Unit : inch

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Steel Ball Valves

AKSC3TFZM

CODE NO. 317F

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NOTE

(1) Plastic covering.

(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

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<th>L</th>
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Unit: inch

051

code 1500 carbon steel 3-piece type ball valves
Steel Ball Valves

AKSC3TFZM
CODE NO. 317F

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NOTE

(1) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.
Steel Ball Valves

AKSC3TFZM-O
CODE NO. 317F-LOH

MATERIAL LIST

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NOTE
(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

DIMENSIONS

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Unit: inch

053
type 1500 carbon steel 3-piece type ball valves
Steel Ball Valves

AKSC3THZM
CODE NO. 317

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NOTE

(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

DIMENSIONS

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Steel Ball Valves

AKSC3THZM
CODE NO. 317

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NOTE

(1) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

DIMENSIONS

Nominal Size | Unit: inch |
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<tr>
<th>in.</th>
<th>d</th>
<th>H</th>
<th>D1</th>
<th>L</th>
<th>d2</th>
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<th>F</th>
<th>K</th>
<th>G</th>
<th>J</th>
<th>h</th>
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Mounting Dimensions for Actuator

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055 type 1000 carbon steel 3-piece type ball valves
Steel Ball Valves

AKSC3THZM-O
CODE NO. 317-LOH

MATERIAL LIST

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NOTE
(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.
Steel Ball Valves

AKSC3TFZM-FS
CODE NO. 319F

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NOTE

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Unit: inch

Mounting Dimensions for Actuator
Steel Ball Valves

AKSC3TFZM-FS
CODE NO. 319F

MATERIAL LIST

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<td>CAP</td>
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NOTE

(1) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.
(2) Flexible graphite with stainless foil insert.

DIMENSIONS

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058
Steel Ball Valves

AKSC3TFZM-FSO
CODE NO. 319F-LOH

NOTE
(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

MATERIAL LIST

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DIMENSIONS

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Mounting Dimensions for Actuator

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Unit: inch
Steel Ball Valves

AKSC3THZM-FS
CODE NO. 319

**MATERIAL LIST**

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<tr>
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<td>CAP</td>
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<td>3</td>
<td>STEM</td>
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<td>A276 TYPE 316 or A351 Gr. CF8M</td>
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<tr>
<td>7</td>
<td>GLAND</td>
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</tr>
<tr>
<td>8 A</td>
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<td>8 B</td>
<td>SPACER PACKING</td>
<td>G/F PTFE</td>
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<td>HANDLE</td>
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<td>16 A</td>
<td>WASHER</td>
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**NOTE**

(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

### DIMENSIONS

**Nominal Size**

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**Mounting Dimensions for Actuator**

- **A**: Body
- **B**: Stem
- **C**: Ball
- **D**: Gland
- **E**: Handle
- **F**: Name Plate
- **G**: Washer
- **H**: Gasket
- **I**: Ball Seat
- **J**: Gland Nut
- **K**: Cap Bolt
- **L**: Lock Plate
- **M**: Cone Disc Springs
- **N**: Thrust Washer
- **O**: Stopper Pin
- **P**: Latch Lock

**Unit : inch**

060
Steel Ball Valves

AKSC3THZM-FS

CODE NO. 319

MATERIAL LIST

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<th>No.</th>
<th>Name of Parts</th>
<th>Materials</th>
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<td>STEM</td>
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<td>HANDLE</td>
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NOTE

(1) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

Flexible graphite with stainless foil insert.

Flexible graphite with stainless foil insert.

DIMENSIONS

| Nominal Size | d | H  | D1 | L  | d2 | A | B  | C  | E  | F  | K  | G  | J  | h  | M  | ISO 5211 Flange Type |
|--------------|---|----|----|----|----|---|----|----|----|----|----|----|----|----|---------------------|
| 2 1/2        | 1.97 | 5.98 | 9.06 | 5.98 | NPT 2 1/2 | 3.15 | 1.34 | 0.67 | 0.67 | 2.17 | 0.87 | 2.78 | 1/4-18UNC | 0.60 | 0.67 | F07                  |

Unit : inch
Steel Ball Valves

AKSC3THZM-FSO
CODE NO. 319-LOH

MATERIAL LIST

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NOTE

(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

DIMENSIONS

Nominal Size | d | H | D1 | L | d2 | A | B | C | E | F | G | J | h | M | ISO 5211 Flange Type
------------|---|---|----|---|----|---|---|---|---|---|---|---|---|---|-------------------|
1/8         | 0.39 | 2.48 | 3.94 | 2.48 | NPT 1/8 | 1.04 | 0.08 | 0.41 | — | — | 1.97 | 1/4-20UNC | 0.28 | M8 | 0.20 | —
1/4         | 0.55 | 3.07 | 5.12 | 2.80 | NPT 1/4 | 1.38 | 0.17 | 0.56 | 0.98 | 0.12 | 1.42 | 1/4-20UNC | 0.20 | M10 | 0.24 | F03
1           | 0.75 | 3.43 | 5.12 | 3.54 | NPT 1   | 1.69 | 0.20 | 0.67 | 1.18 | 0.12 | 1.65 | 1/4-20UNC | 0.32 | M12 | 0.34 | F04
Steel Ball Valves

AKUTKZM-FS
CODE NO. 129-LOH

MATERIAL LIST

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NOTE

(1) Plastic covering.

(2) Valve rating 2000WOG (size 1/4 to 1), 1500WOG (size 1/2 to 2).

DIMENSIONS

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Steel Ball Valves

AKUTKZM-FSO
CODE NO. 129-LOH

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**NOTE**

(1) Plastic covering.
(2) Valve rating 2000WOG (size 1/4 to 1), 1500WOG (size 1/2 to 2).

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Unit: inch
Steel Ball Valves

AKUTHZM

CODE NO. 227

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NOTE

(1) Plastic covering.
(2) BS 5351 Class 800 (size 1/4 to 1), KITZ standard (size 1/4 to 2).
(3) Valve rating 2000WOG (size 1/4 to 1), 1500WOG (size 1/4 to 2).

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Steel Ball Valves

AKUTHZM-O

CODE NO. 227-LOH

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NOTE

(1) Plastic covering.
(2) BS 5351 Class 800 (size 1/4 to 1), KITZ standard (size 1/4 to 2).
(3) Valve rating 2000WOG (size 1/4 to 1), 1500WOG (size 1/4 to 2)

DIMENSIONS

Unit: inch

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cast stainless steel 2-piece ball valves
Steel Ball Valves

AKUTHZM-FS
CODE NO. 229

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NOTE

(1) Plastic covering.
(2) BS 5351 Class 800 (size 1/4 to 1), KITZ standard (size 1/4 to 2).
(3) Valve rating 2000WOG (size 1/4 to 1), 1500WOG (size 1/4 to 2).

DIMENSIONS

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Steel Ball Valves

AKUTHZM-FSO
CODE NO. 229-LOH

MATERIAL LIST

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NOTE
(1) Plastic covering.
(2) BS 5351 Class 800 (size 1 to 1), KITZ standard (size 1 to 1), 1500WOG (size 1 to 2).
(3) Valve rating 2000WOG (size 1 to 1), 1500WOG (size 1 to 2).

DIMENSIONS

| Nominal Size | d   | H     | D1   | L    | d2   | S1   | P1   | P2   | E    | F    | T    |
|--------------|-----|-------|------|------|------|------|------|------|------|------|------|------|
| 1/4          | 0.37| 2.42  | 3.94 | 2.09 | NPT  | 1/4  | 0.83 | 0.50 | 1.12 | 0.57 | No.10-24UNC |
| 1/2          | 0.37| 2.42  | 3.94 | 2.09 | NPT  | 1/2  | 0.95 | 0.50 | 1.12 | 0.57 | No.10-24UNC |
| 3/4          | 0.39| 2.46  | 3.94 | 2.44 | NPT  | 3/4  | 1.10 | 0.50 | 1.12 | 0.53 | No.10-24UNC |
| 1            | 0.59| 2.64  | 3.94 | 2.83 | NPT  | 1/4  | 1.38 | 0.87 | 1.37 | 0.55 | No.10-24UNC |
| 1/10         | 0.79| 2.70  | 3.94 | 3.35 | NPT  | 1    | 1.61 | 0.87 | 1.50 | 0.57 | No.10-24UNC |
| 1/4          | 0.98| 2.85  | 3.94 | 3.70 | NPT  | 1/4  | 2.05 | 0.93 | 1.50 | 0.53 | 1/4-20UNC |
| 1/2          | 1.26| 3.66  | 5.12 | 4.21 | NPT  | 1/2  | 2.32 | 0.93 | 1.50 | 0.67 | 1/2-20UNC |
| 2            | 1.57| 3.98  | 7.09 | 4.72 | NPT  | 2    | 2.84 | 0.93 | 1.50 | 0.59 | 1/2-20UNC |

Unit: inch

cast stainless steel 2-piece ball valves
**Steel Ball Valves**

**AKUTHWZM**

**CODE NO. 247**

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**MATERIAL LIST**

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**NOTE**

1. Plastic covering.
2. BS 5351 Class 800 (size 1/4 to 1), KITZ standard (size 1/4 to 2).
3. Valve rating 2000WOG (size 1/4 to 1), 1500WOG (size 1/4 to 2).

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**DIMENSIONS**

Unit: inch

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<th>H</th>
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<th>L</th>
<th>d2</th>
<th>S1</th>
<th>P1</th>
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**069**

cast stainless steel seal weld type ball valves
Steel Ball Valves

AKUTHWZM-O
CODE NO. 247-LOH

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NOTE

(1) Plastic covering.
(2) BS 5351 Class 800 (size 1¼ to 1), KITZ standard (size 1¼ to 2).
(3) Valve rating 2000WOG (size 1¼ to 1), 1500WOG (size 1¼ to 2)

DIMENSIONS

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TAPPLING Pad

D1

MATERIAL LIST

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NOTE

(1) Plastic covering.
(2) BS 5351 Class 800 (size 1¼ to 1), KITZ standard (size 1¼ to 2).
(3) Valve rating 2000WOG (size 1¼ to 1), 1500WOG (size 1¼ to 2)
### MATERIAL LIST

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**NOTE**

1. Plastic covering.
2. BS 5351 Class 800 (size 1/4 to 1), KITZ standard (size 1/4 to 2).
3. Valve rating 2000WOG (size 1/4 to 1), 1500WOG (size 1/4 to 2).

### DIMENSIONS

**Unit: inch**

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<th>D1</th>
<th>L</th>
<th>d2</th>
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<th>P1</th>
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[Diagram of Steel Ball Valves: AKUTHWZM-FS CODE NO. 249]
Steel Ball Valves

AKUTHWZM-FSO
CODE NO. 249-LOH

MATERIAL LIST

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<th>Materials</th>
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<td>A351 Gr. CF8M</td>
</tr>
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<td>BODY CAP</td>
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NOTE

(1) Plastic covering.
(2) BS 5351 Class 800 (size 1/4 to 1), KITZ standard (size 1/4 to 2).
(3) Valve rating 2000WOG (size 1/4 to 1), 1500WOG (size 1/4 to 2).

Dimensions

Unit: inch

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<th>L</th>
<th>d2</th>
<th>S1</th>
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<th>P2</th>
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Steel Ball Valves

AKUTKM
CODE NO. 52

MATERIAL LIST

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<tr>
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<tr>
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<tr>
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NOTE
(1) Plastic covering.

DIMENSIONS

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<th>L1</th>
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Unit: inch
Steel Ball Valves

AKUTHM
CODE NO. 53

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<td>THRUST WASHER</td>
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NOTE
(1) Plastic covering.
(2) Cr plating.

DIMENSIONS

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Unit : inch

type 800 cast stainless steel ball valves
Steel Ball Valves

AKU3TFZM-O
CODE NO. 327F-LOH

MATERIAL LIST

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<th>No.</th>
<th>Name of Parts</th>
<th>Materials</th>
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<tbody>
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<td>2</td>
<td>CAP</td>
<td>A351 Gr. CF8M</td>
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<td>STEM</td>
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NOTE
(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

DIMENSIONS

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Type 1500 Stainless Steel 3-piece Type Ball Valves
# Steel Ball Valves

**AKU3TFZM**  
**CODE NO. 327F**

![Diagram of the valve](image)

### MATERIAL LIST

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### NOTE

1. Plastic covering.
2. All valves have an anti-static thrust washer insuring positive conductivity between body and stem.
Steel Ball Valves

AKU3TFZM
CODE NO. 327F

type 1000 stainless steel 3-piece type ball valves

MATERIAL LIST

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<thead>
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<tr>
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NOTE

(1) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

DIMENSIONS

| Nominal Size | d   | H   | D1  | L   | d2  | A    | B    | C    | E    | F    | K    | G    | J    | h    | M    | ISO 5211 Flange Type |
|--------------|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|-------------------|
| 2            | 1.97| 5.98| 9.06| 5.98| NPT 2| 3.15 | 1.34 | 0.67 | 0.67 | 2.17 | 0.87 | 2.76 | 0.59 | 0.67 | F07               |

077 type 1000 stainless steel 3-piece type ball valves
Steel Ball Valves

AKU3TFZM-FSO
CODE NO. 329F-LOH

MATERIAL LIST

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<td>STEM</td>
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<td>STAINLESS STEEL</td>
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<td>16 B</td>
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<td>A</td>
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NOTE
(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

DIMENSIONS

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<th>B</th>
<th>C</th>
<th>E</th>
<th>F</th>
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Unit: inch
Steel Ball Valves

AKU3TFZM-FS
CODE NO. 329F

MATERIAL LIST

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<td>CAP</td>
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<td>3</td>
<td>STEM</td>
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NOTE

(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

DIMENSIONS

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<th>Nominal Size</th>
<th>d</th>
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<th>D1</th>
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<th>A</th>
<th>B</th>
<th>C</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>J</th>
<th>h</th>
<th>K</th>
<th>M</th>
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**Steel Ball Valves**

**AKU3TFZM-FS**  
**CODE NO. 329F**

### MATERIAL LIST

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### NOTE

1. All valves have an anti-static thrust washer insuring positive conductivity between body and stem.
2. Flexible graphite with stainless foil insert.

### DIMENSIONS

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<th>Nominal Size</th>
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<th>F</th>
<th>K</th>
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**type 1000 stainless steel 3-piece type ball valves**
Steel Ball Valves

AKU3THZM-O
CODE NO. 327-LOH

MATERIAL LIST

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<th>No.</th>
<th>Name of Parts</th>
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<td>STEM</td>
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NOTE
(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.
Steel Ball Valves

AKU3THZM
CODE NO. 327

MATERIAL LIST

No. | Name of Parts | Materials
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1 | BODY | A351 Gr. CF8M
2 | CAP | A351 Gr. CF8M
3 | STEM | A276 TYPE 316
4 | BALL | A276 TYPE 316 or A351 Gr. CF8M
7 | GLAND | A276 TYPE 316
8 | GLAND PACKING | PTFE
9 | HANDLE | A276 TYPE 430 (1)
10 | HANDLE NUT | A194 Gr. 8
16 | WASHER | STAINLESS STEEL
16 | NAME PLATE | STAINLESS STEEL
19 | GASKET | STAINLESS STEEL
30 | BALL SEAT | STAINLESS STEEL
34 | GLAND NUT | 25% CARBON FILLED PTFE (2)
35 | CAP BOLT | A193 Gr. B8
40 | LOCK PLATE | STAINLESS STEEL
43 | CONED DISC SPRINGS | STAINLESS STEEL
47 | THRUST WASHER | STAINLESS STEEL
126 | STOPPER PIN | STAINLESS STEEL
A | LATCH LOCK | STAINLESS STEEL

NOTE
(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

DIMENSIONS

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<th>Nominal Size</th>
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<th>L</th>
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<th>B</th>
<th>C</th>
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Mounting Dimensions for Actuator

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Steel Ball Valves

AKU3THZM
CODE NO. 327

type 1000 stainless steel 3-piece type ball valves

type 1500 stainless steel 3-piece type ball valves

MATERIAL LIST

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NOTE
(1) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

DIMENSIONS

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083

083 type 1000 stainless steel 3-piece type ball valves
Steel Ball Valves

AKU3THZM-FSO
CODE NO. 329-LOH

MATERIAL LIST

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<td>A</td>
<td>LATCH LOCK</td>
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</table>

NOTE

(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

DIMENSIONS

| Nominal Size | d  | H  | D1 | L  | d2 | A  | B  | C  | E  | F  | G  | J  | h  | K  | M  | ISO 5211 Flange Type |
|--------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------------|
| 1/2          | 0.39| 2.48| 3.94| 2.48| NPT 1/4 | 1.04 | 0.08 | 0.41 | —   | 1.97 | 1/4-20UNC | 0.28 | M8  | 0.20 | —                  |
| 1/4          | 0.55| 3.07| 5.12| 2.80| NPT 1/4 | 1.38 | 0.17 | 0.56 | 0.98 | 0.12 | 1.42 | 1/4-20UNC | 0.20 | M10 | 0.24 | F03                 |
| 1/2          | 0.75| 3.43| 5.12| 3.54| NPT 1  | 1.69 | 0.20 | 0.67 | 1.18 | 0.12 | 1.65 | 1/2-20UNC | 0.32 | M12 | 0.34 | F04                 |
Steel Ball Valves

AKU3THZM-FS
CODE NO. 329

MATERIAL LIST

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NOTE
(1) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.
(2) Flexible graphite with stainless foil insert.

DIMENSIONS

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<th>C</th>
<th>E</th>
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Steel Ball Valves

AKU3THZM-FS
CODE NO. 329

MATERIAL LIST

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NOTE

(1) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

(2) Flexible graphite with stainless foil insert.

DIMENSIONS

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Mounting Dimensions for Actuator

Unit: inch

086
Steel Ball Valves

BWSC3TFZM-O
CODE NO. 317FB-LOH

MATERIAL LIST

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NOTE

(1) Plastic covering.
(2) All valves have an anti-static thrust washer
insuring positive conductivity between body and stem.

DIMENSIONS

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<th>Nominal Size</th>
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Steel Ball Valves

BWSC3TFZM
CODE NO. 317FB

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<th>Materials</th>
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<tr>
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<td>STEM</td>
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NOTE

(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

DIMENSIONS

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<th>Mounting Dimensions for Actuator</th>
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Unit: inch
Steel Ball Valves

BWSC3TFZM

CODE NO. 317FB

MATERIAL LIST

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NOTE

(1) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

DIMENSIONS

Nominal Size | Welding End | Mounting Dimensions for Actuator
--- | --- | ---
| in. | d | H | D1 | L | d1 | D | P | A | B | C | E | F | K | G | J | h | M | ISO 5211 Flange Type |
| 2 | 1.97 | 5.98 | 9.06 | 5.98 | 2.07 | 2.37 | 0.34 | 3.15 | 1.34 | 0.67 | 0.67 | 2.17 | 0.87 | 0.87 | 2.76 | 1/8-18UNC | 0.59 | 0.67 | F07 |

089
type 1000 carbon steel 3-piece type ball valves
Steel Ball Valves

**BWSC3THZM-O**

**CODE NO. 317B-LOH**

**MATERIAL LIST**

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<td>STEM</td>
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**NOTE**

(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

**DIMENSIONS**

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<th>Nominal Size</th>
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<th>Mounting Dimensions for Actuator</th>
<th>Unit: inch</th>
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**090**
type 1500 carbon steel 3-piece type ball valves
 Steel Ball Valves

BWSC3THZM

CODE NO. 317B

MATERIAL LIST

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NOTE

(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

DIMENSIONS

Nominal Size | Welding End | Mounting Dimensions for Actuator
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Steel Ball Valves

**BWSC3THZM**
**CODE NO. 317B**

**MATERIAL LIST**

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<td>STAINLESS STEEL</td>
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**NOTE**

(1) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

**DIMENSIONS**

| Nominal Size | d     | H   | D1  | L   | d1  | D   | P   | A   | B   | C   | E   | F   | K   | G   | J   | h | M | ISO 5211 Flange Type |
|--------------|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|--|---------------------|
| in.          |       |     |     |     |     |     |     |     |     |     |     |     |     |     |    |  |                    |
| 2½           | 1.97  | 5.98| 5.98| 2.47| 2.87| 0.51| 3.15| 1.34| 0.67| 0.67| 0.87| 0.87| 2.76| ⅜-18UNC         | 0.59| 0.67| F07                 |

**1000 carbon steel 3-piece type ball valves**

092
Steel Ball Valves

BWSC3TFZM-FSO
CODE NO. 319FB-LOH

MATERIAL LIST

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NOTE

(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.
Steel Ball Valves

BWSC3TFZM-FS

CODE NO. 319FB

MATERIAL LIST

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NOTE

(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

DIMENSIONS

Nominal Size | Welding End | Mounting Dimensions for Actuator

| Unit: inch |

| in. | d    | H    | D1   | L    | d1   | D    | P    | A    | B    | C    | E    | F    | G    | J    | h    | K    | M    | ISO 5211 Flange Type |
|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------------|
| 1   | 0.94 | 3.23 | 5.91 | 4.06 | 1.05 | 1.32 | 0.22 | 1.73 | 0.53 | 1.08 | 1.18 | 0.12 | 1.65 | ¼-20UNC | 0.32 | M14 | 0.39 | F04                |
| 1/4 | 1.18 | 3.46 | 5.91 | 4.33 | 1.38 | 1.66 | 0.32 | 1.95 | 0.53 | 1.07 | 1.18 | 0.12 | 1.65 | ¼-20UNC | 0.32 | M14 | 0.39 | F04                |
| 1/2 | 1.50 | 4.09 | 7.09 | 5.00 | 1.62 | 1.90 | 0.22 | 2.24 | 0.46 | 1.14 | 1.38 | 0.12 | 1.97 | ¼-20UNC | 0.39 | M16 | 0.39 | F05                |
Steel Ball Valves

BWSC3TFZM-FS
CODE NO. 319FB

MATERIAL LIST

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of Parts</th>
<th>Materials</th>
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<tbody>
<tr>
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</tr>
<tr>
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<td>CAP</td>
<td>A216 Gr. CF WCB</td>
</tr>
<tr>
<td>3</td>
<td>STEM</td>
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</tr>
<tr>
<td>4</td>
<td>BALL</td>
<td>A351 Gr. CF8M</td>
</tr>
<tr>
<td>7</td>
<td>GLAND</td>
<td>A351 Gr. CF8</td>
</tr>
<tr>
<td>8A</td>
<td>GLAND PACKING</td>
<td>FLEXIBLE GRAPHITE</td>
</tr>
<tr>
<td>8B</td>
<td>SPACER PACKING</td>
<td>G/F PTFE</td>
</tr>
<tr>
<td>9</td>
<td>HANDLE</td>
<td>DUCTILE IRON</td>
</tr>
<tr>
<td>16</td>
<td>NAME PLATE</td>
<td>STAINLESS STEEL</td>
</tr>
<tr>
<td>19</td>
<td>GASKET</td>
<td>(2)</td>
</tr>
<tr>
<td>30</td>
<td>BALL SEAT</td>
<td>HYDROTE PTFE</td>
</tr>
<tr>
<td>35</td>
<td>CAP BOLT</td>
<td>A193 Gr. B8</td>
</tr>
<tr>
<td>36</td>
<td>GLAND BOLT</td>
<td>A193 Gr. B8</td>
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<td>40</td>
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<td>STAINLESS STEEL</td>
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<td>25% CARBON FILLED PTFE (1)</td>
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<td>48</td>
<td>SNAP RING</td>
<td>STAINLESS STEEL</td>
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<td>STAINLESS STEEL</td>
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<td>STAINLESS STEEL</td>
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<tr>
<td>124</td>
<td>SPRING &amp; PIN</td>
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<td>126</td>
<td>STOPPER PIN</td>
<td>STAINLESS STEEL</td>
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</tbody>
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NOTE
(1) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.
(2) Flexible graphite with stainless foil insert.

DIMENSIONS

<table>
<thead>
<tr>
<th>Nominal Size</th>
<th>Welding End</th>
<th>Mounting Dimensions for Actuator</th>
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<tr>
<td></td>
<td>L</td>
<td>D1</td>
</tr>
<tr>
<td></td>
<td>d1</td>
<td>D</td>
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<tr>
<td></td>
<td>P</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>C</td>
</tr>
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<td></td>
<td>E</td>
<td>F</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>J</td>
<td>h</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>ISO 5211 Flange Type</td>
</tr>
</tbody>
</table>

Unit: inch

| 2  | 1.97 | 5.98 | 9.06 | 5.98 | 2.07 | 2.37 | 0.34 | 3.15 | 1.34 | 0.67 | 0.67 | 2.17 | 0.87 | 2.76 | 1/8-18UNC | 0.59 | 0.67 | F07 |

Type 1000 carbon steel 3-piece type ball valves
Steel Ball Valves

BWSC3THZM-FSO
CODE NO. 319B-LOH

MATERIAL LIST

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<tr>
<th>No.</th>
<th>Name of Parts</th>
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<td>A216 Gr. WCB</td>
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<tr>
<td>2</td>
<td>CAP</td>
<td>A216 Gr. WCB</td>
</tr>
<tr>
<td>3</td>
<td>STEM</td>
<td>A276 TYPE 316</td>
</tr>
<tr>
<td>4</td>
<td>BALL</td>
<td>A276 TYPE 316 or A351 Gr. CF8M</td>
</tr>
<tr>
<td>7</td>
<td>GLAND</td>
<td>A276 TYPE 316</td>
</tr>
<tr>
<td>8 A</td>
<td>GLAND PACKING</td>
<td>FLEXIBLE GRAPHITE</td>
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<tr>
<td>8 B</td>
<td>SPACER PACKING</td>
<td>G/F PTFE</td>
</tr>
<tr>
<td>9</td>
<td>HANDLE</td>
<td>A276 TYPE 430 (1)</td>
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<tr>
<td>10</td>
<td>HANDLE NUT</td>
<td>A194 Gr. B8</td>
</tr>
<tr>
<td>16 A</td>
<td>WASHER</td>
<td>STAINLESS STEEL</td>
</tr>
<tr>
<td>16 B</td>
<td>NAME PLATE</td>
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<tr>
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<tr>
<td>30</td>
<td>BALL SEAT</td>
<td>HYMATITE PTFE</td>
</tr>
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<td>34</td>
<td>GLAND NUT</td>
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<tr>
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<td>CAP BOLT</td>
<td>A193 Gr. B8</td>
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<tr>
<td>40</td>
<td>LOCK PLATE</td>
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<tr>
<td>43</td>
<td>CONED DISC SPRINGS</td>
<td>STAINLESS STEEL</td>
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<tr>
<td>47</td>
<td>THRUST WASHER</td>
<td>25% CARBON FILLED PTFE (2)</td>
</tr>
<tr>
<td>126</td>
<td>STOPPER PIN</td>
<td>A276 TYPE 304</td>
</tr>
<tr>
<td>A</td>
<td>LATCH LOCK</td>
<td>STAINLESS STEEL</td>
</tr>
</tbody>
</table>

NOTE
(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

DIMENSIONS

<table>
<thead>
<tr>
<th>Nominal Size</th>
<th>Welding End</th>
<th>Mounting Dimensions for Actuator</th>
<th>Unit: inch</th>
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<tbody>
<tr>
<td></td>
<td>d</td>
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<td>⅛”</td>
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<td>1”</td>
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Steel Ball Valves

BWSC3THZM-FS
CODE NO. 319B

MATERIAL LIST

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<th>No.</th>
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<tr>
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<td>CAP</td>
<td>A216 Gr. WCB</td>
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<tr>
<td>3</td>
<td>STEM</td>
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<tr>
<td>4</td>
<td>BALL</td>
<td>A276 TYPE 316 or A351 Gr. CF8M</td>
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<tr>
<td>7</td>
<td>GLAND</td>
<td>A276 TYPE 316</td>
</tr>
<tr>
<td>8 A</td>
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<td>FLEXIBLE GRAPHITE</td>
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<tr>
<td>8 B</td>
<td>SPACER PACKING</td>
<td>G/F PTFE</td>
</tr>
<tr>
<td>9</td>
<td>HANDLE</td>
<td>A276 TYPE 430 (1)</td>
</tr>
<tr>
<td>10</td>
<td>HANDLE NUT</td>
<td>A194 Gr. B8</td>
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<tr>
<td>16</td>
<td>WASHER</td>
<td>STAINLESS STEEL</td>
</tr>
<tr>
<td>16 B</td>
<td>NAME PLATE</td>
<td>STAINLESS STEEL</td>
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<tr>
<td>19</td>
<td>GASKET</td>
<td>FLEXIBLE GRAPHITE</td>
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<tr>
<td>30</td>
<td>BALL SEAT</td>
<td>HYDRAULITE PTFE</td>
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<tr>
<td>34</td>
<td>GLAND NUT</td>
<td>A194 Gr. B8</td>
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<tr>
<td>35</td>
<td>CAP BOLT</td>
<td>A193 Gr. B8</td>
</tr>
<tr>
<td>40</td>
<td>LOCK PLATE</td>
<td>STAINLESS STEEL</td>
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<tr>
<td>43</td>
<td>CONED DISC SPRINGS</td>
<td>STAINLESS STEEL</td>
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<tr>
<td>47</td>
<td>THRUST WASHER</td>
<td>25% CARBON FILLED PTFE (2)</td>
</tr>
<tr>
<td>126</td>
<td>STOPPER PIN</td>
<td>A276 TYPE 304</td>
</tr>
<tr>
<td>A</td>
<td>LATCH LOCK</td>
<td>STAINLESS STEEL</td>
</tr>
</tbody>
</table>

NOTE

(1) Plastic covering.
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DIMENSIONS

<table>
<thead>
<tr>
<th>Nominal Size</th>
<th>Welding End</th>
<th>Mounting Dimensions for Actuator</th>
</tr>
</thead>
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<tr>
<td>in.</td>
<td>D H D1 L</td>
<td>D P A B C E F G J h K M ISO 5211</td>
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</tr>
<tr>
<td>1 1/2</td>
<td>1.18 3.46 5.91 4.33 1.62 1.90 0.32 1.95 0.53 1.07 1.18 0.12 1.65 1/4-20UNC 0.32 M14 0.39 F04</td>
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<td>2</td>
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Steel Ball Valves

BWSC3THZM-FS
CODE NO. 319B

MATERIAL LIST

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<th>No.</th>
<th>Name of Parts</th>
<th>Materials</th>
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<tr>
<td>1</td>
<td>BODY</td>
<td>A216 Gr. WCB</td>
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<td>CAP</td>
<td>A216 Gr. WCB</td>
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<tr>
<td>3</td>
<td>STEM</td>
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<td>4</td>
<td>BALL</td>
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<td>8 A</td>
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<td>8 B</td>
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<tr>
<td>9</td>
<td>HANDLE</td>
<td>DUCTILE IRON</td>
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<tr>
<td>16</td>
<td>NAME PLATE</td>
<td>STAINLESS STEEL</td>
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<tr>
<td>19</td>
<td>GASKET</td>
<td>(2)</td>
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<tr>
<td>30</td>
<td>BALL SEAT</td>
<td>HYPATITE PTFE</td>
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<td>126</td>
<td>STOPPER PIN</td>
<td>STAINLESS STEEL</td>
</tr>
</tbody>
</table>

NOTE

(1) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.
(2) Flexible graphite with stainless foil insert.

DIMENSIONS

<table>
<thead>
<tr>
<th>Nominal Size</th>
<th>Welding End</th>
<th>Mounting Dimensions for Actuator</th>
<th>Unit: inch</th>
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(type 1000 carbon steel 3-piece type ball valves)
Steel Ball Valves

BWU3TFZM-O

CODE NO. 327FB-LOH

**MATERIAL LIST**

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<th>Name of Parts</th>
<th>Materials</th>
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<tr>
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<tr>
<td>A</td>
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<td>STAINLESS STEEL</td>
</tr>
</tbody>
</table>

**NOTE**

(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.
Steel Ball Valves

BWU3TFZM

CODE NO. 327FB

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<th>No.</th>
<th>Name of Parts</th>
<th>Materials</th>
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<td>A</td>
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<td>STAINLESS STEEL</td>
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**NOTE**

(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

**DIMENSIONS**

Nominal Size | Welding End | Mounting Dimensions for Actuator
---|---|---
| in. | d | H | D1 | L | d1 | D | P | A | B | C | E | F | G | J | h | K | M | ISO 5211 Flange Type |
|-----|---|---|----|---|----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1   | 0.94 | 3.23 | 5.91 | 4.06 | 1.05 | 1.32 | 0.22 | 1.73 | 0.53 | 1.08 | 1.18 | 0.12 | 1.65 | 1/4-20UNC | 0.32 | M14 | 0.39 | F04 |
| 1\3/4 | 1.18 | 3.46 | 5.91 | 4.33 | 1.38 | 1.66 | 0.32 | 1.95 | 0.53 | 1.07 | 1.18 | 0.12 | 1.65 | 1/4-20UNC | 0.32 | M14 | 0.39 | F04 |
| 1\1/2 | 1.50 | 4.09 | 7.09 | 5.00 | 1.62 | 1.90 | 0.22 | 2.24 | 0.46 | 1.14 | 1.38 | 0.12 | 1.97 | 1/4-20UNC | 0.39 | M16 | 0.39 | F05 |

Unit : inch

(type 1500 stainless steel 3-piece type ball valves)

100
Steel Ball Valves

BWU3TFZM
CODE NO. 327FB

MATERIAL LIST

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NOTE

(1) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

DIMENSIONS

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<th>Mounting Dimensions for Actuator</th>
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<td>d1 D P A B C E F G J h M</td>
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ISO 5211 Flange Type

Unit: inch

type 1000 stainless steel 3-piece type ball valves
Steel Ball Valves

BWU3THZM
CODE NO. 327B-LOH

MATERIAL LIST

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<td>CAP</td>
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<tr>
<td>A</td>
<td>LATCH LOCK</td>
<td>STAINLESS STEEL</td>
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NOTE
(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

Nominal Size
Unit : inch

| Size | d   | H   | D1  | L   | d1 | D   | P   | A   | B   | C   | E   | F   | G   | J   | h   | K   | M   | ISO 5211 Flange Type |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------------------|
| 1/8  | 0.39| 2.48| 3.94| 2.48| 0.62| 0.84| 0.24| 1.04| 0.08| 0.41| 1.97| 1/4-20UNC | 0.28 | M8  | 0.20 | —       |
| 1/4  | 0.55| 3.07| 5.12| 2.76| 0.83| 1.05| 0.28| 1.38| 0.17| 0.56| 0.98| 0.12| 1/4-20UNC | 0.20 | M10 | 0.24 | F03     |
| 1    | 0.75| 3.43| 5.12| 3.50| 1.05| 1.28| 0.28| 1.69| 0.20| 0.67| 1.18| 0.12| 1/4-20UNC | 0.32 | M12 | 0.34 | F04     |
Steel Ball Valves

BWU3THZM
CODE NO. 327B

**MATERIAL LIST**

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<td>LATCH LOCK</td>
<td>STAINLESS STEEL</td>
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**NOTE**

(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

**DIMENSIONS**

Nominal Size | Unit | d | H | D1 | L | d1 | D | P | A | B | C | E | F | G | J | h | K | M | ISO 5211 Flange Type
1 1/4 | inch | 0.94 | 3.23 | 5.91 | 4.06 | 1.38 | 1.66 | 0.24 | 1.73 | 0.53 | 1.08 | 1.18 | 0.12 | 1.65 | 1/4-20UNC | 0.32 | M14 | 0.39 | F04 |
1 1/2 | inch | 1.18 | 3.46 | 5.91 | 4.33 | 1.62 | 1.90 | 0.32 | 1.95 | 0.53 | 1.07 | 1.18 | 0.12 | 1.65 | 1/4-20UNC | 0.32 | M14 | 0.39 | F04 |
2    | inch | 1.50 | 4.09 | 7.09 | 5.00 | 2.07 | 2.37 | 0.34 | 2.24 | 0.46 | 1.14 | 1.38 | 0.12 | 1.97 | 1/4-20UNC | 0.39 | M16 | 0.39 | F05 |

Unit : inch
Steel Ball Valves

BWU3THZM
CODE NO. 327B

MATERIAL LIST

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NOTE
(1) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

DIMENSIONS

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<th>H</th>
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<th>L</th>
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<th>P</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>J</th>
<th>h</th>
<th>M</th>
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Type 1000 Stainless Steel 3-Piece Type Ball Valves

104
**Steel Ball Valves**

**BWU3TFZM-FSO**

**CODE NO. 329FB-LOH**

**MATERIAL LIST**

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<th>Name of Parts</th>
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<tr>
<td>2</td>
<td>CAP</td>
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<td>STEM</td>
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**NOTE**

(1) Plastic covering.

(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

**DIMENSIONS**

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**Steel Ball Valves**

BWU3TFZM-FS

CODE NO. 329FB

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**NOTE**

(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

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**Nominal Size**

- 1
- 1 1/4
- 1 1/2

**Unit: inch**

- type 1500 stainless steel 3-piece type ball valves
Steel Ball Valves

BWU3TFZM-FS
CODE NO. 329FB

type 1000 stainless steel 3-piece type ball valves

type 1500 stainless steel 3-piece type ball valves

CODE NO. 329FB

- BODY
- CAP
- STEM
- BALL
- GLAND
- GLAND PACKING
- SPACER PACKING
- HANDLE
- HANDLE NUT
- WASHER
- NAME PLATE
- GASKET
- BALL SEAT
- GLAND NUT
- CAP BOLT
- LOCK PLATE
- CONED DISC SPRINGS
- THRUST WASHER
- STOPPER PIN
- LATCH LOCK

1. BODY
2. CAP
3. STEM
4. BALL
5. GLAND
6. GLAND PACKING
7. SPACER PACKING
8. HANDLE
9. GASKET
10. BALL SEAT
11. CAP BOLT
12. LOCK PLATE
13. CONED DISC SPRINGS
14. THRUST WASHER
15. STOPPER PIN
16. NAME PLATE

MATERIAL LIST

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<th>No.</th>
<th>Name of Parts</th>
<th>Materials</th>
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NOTE

(1) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.
(2) Flexible graphite with stainless foil insert.

DIMENSIONS

<table>
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<tr>
<th>Nominal Size</th>
<th>Welding End</th>
<th>Mounting Dimensions for Actuator</th>
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Unit : inch
Steel Ball Valves

BWU3THZM-FSO
CODE NO. 329B-LOH

MATERIAL LIST

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<th>Name of Parts</th>
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<td>STEM</td>
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<td>HANDLE</td>
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<td>16A</td>
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NOTE

(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.
Steel Ball Valves

BWU3THZM-FS
CODE NO. 329B

MATERIAL LIST

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<td>STEM</td>
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</tr>
</tbody>
</table>

NOTE

(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

DIMENSIONS

| Nominal Size | d    | H    | D1   | L    | d1   | D    | P    | A    | B    | C    | E    | F    | G    | J    | h    | K    | M    | ISO 5211 Flange Type |
|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--------------|
| 1 1/4        | 1.18 | 3.45 | 5.91 | 4.03 | 1.64 | 1.52 | 0.24 | 0.85 | 0.51 | 1.18 | 1.28 | 0.12 | 1.65 | 0.32 | M14 | 0.39 | F04          |
| 1 1/2        | 1.50 | 4.07 | 7.08 | 5.05 | 2.09 | 2.32 | 0.34 | 1.37 | 0.46 | 1.13 | 1.38 | 0.12 | 1.93 | 0.39 | M16 | 0.39 | F05          |
| 2            |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |             |

Unit : inch
Steel Ball Valves

BWU3THZM-FS
CODE NO. 329B

MATERIAL LIST

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<td>STEM</td>
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NOTE

(1) All valves have an anti-static thrust washer ensuring positive conductivity between body and stem.
(2) Flexible graphite with stainless foil insert.

DIMENSTIONS

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<th>Nominal Size</th>
<th>Welding End</th>
<th>Mounting Dimensions for Actuator</th>
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type 1000 stainless steel 3-piece type ball valves
**Steel Ball Valves**

**AWSC3TFZM-O**

**CODE NO. 317FS-LOH**

type 1500 carbon steel 3-piece type ball valves

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<th>Name of Parts</th>
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**NOTE**

(1) Plastic covering.
(2) All valves have an anti-static thrust washer
insuring positive conductivity between body and stem.

**MATERIAL LIST**

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<th>No.</th>
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<td>STAINLESS STEEL</td>
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**DIMENSIONS**

| Nominal Size | d | H | D1 | L | d1 | p | A | B | C | E | F | G | J | h | K | M | ISO 5211 Flange Type |
|--------------|---|---|----|---|----|---|---|---|---|---|---|---|---|---|---|-------------------|
| 1/4          | 0.39 | 2.48 | 3.94 | 2.48 | 0.56 | 0.38 | 1.04 | 0.08 | 0.41 | — | — | 1.97 | 1/4-20UNC | 0.28 | M8 | 0.20 | — |
| 1/2          | 0.39 | 2.48 | 3.94 | 2.48 | 0.69 | 0.38 | 1.04 | 0.08 | 0.41 | — | — | 1.97 | 1/4-20UNC | 0.28 | M8 | 0.20 | — |
| 3/4          | 0.55 | 3.07 | 5.12 | 2.80 | 0.86 | 0.38 | 1.38 | 0.17 | 0.56 | 0.98 | 0.12 | 1.42 | 1/4-20UNC | 0.20 | M10 | 0.24 | F03 |
| 1            | 0.75 | 3.43 | 5.12 | 3.54 | 1.07 | 0.50 | 1.69 | 0.20 | 0.67 | 1.18 | 0.12 | 1.65 | 1/4-20UNC | 0.32 | M12 | 0.34 | F04 |

**Unit:** inch
Steel Ball Valves

**AWSC3TFZM**

**CODE NO. 317FS**

- **Type:** 1500 carbon steel 3-piece type ball valves

**Materials**

<table>
<thead>
<tr>
<th>Name of Parts</th>
<th>No.</th>
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<tr>
<td>STEM</td>
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<tr>
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<tr>
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<td>PTFE</td>
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<tr>
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<tr>
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<td>LATCH LOCK</td>
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**NOTE**

1. Plastic covering.
2. All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

**Dimensions**

| Nominal Size | d  | H   | D1  | L   | d1  | P   | A   | B   | C   | E   | F   | G   | J   | h   | K   | M   | ISO 5211 Flange Type |
|--------------|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------------------|
| 1/8          | 1.50 | 4.09 | 7.09 | 5.00  | 1.92 | 0.50  | 2.24 | 0.46 | 1.14 | 1.38 | 0.12 | 1.97 | 1/4-20UNC | 0.39 | M16 | F05                  |
| 1/4          | 1.18 | 3.46 | 5.91 | 4.33  | 1.68 | 0.50  | 1.95 | 0.53 | 1.07 | 1.18 | 0.12 | 1.65 | 1/4-20UNC | 0.32 | M14 | F04                  |
| 1/2          | 0.94 | 3.23 | 5.91 | 4.06  | 1.33 | 0.50  | 1.73 | 0.53 | 1.08 | 1.18 | 0.12 | 1.65 | 1/4-20UNC | 0.32 | M14 | F04                  |

**Nominal Size:** 0.39, 0.39, 0.55, 0.75

Unit: Inch

**Flange Type:** ISO 5211
Steel Ball Valves

AWSC3TFZM
CODE NO. 317FS

MATERIAL LIST

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NOTE

(1) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

DIMENSIONS

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<th>Nominal Size</th>
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<th>L</th>
<th>d1</th>
<th>P</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>J</th>
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<td>0.87</td>
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Nominal Size: type 1000 carbon steel 3-piece type ball valves
Steel Ball Valves

AWSC3THZM-O
CODE NO. 317S-LOH

MATERIAL LIST

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<th>Name of Parts</th>
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<td>PTFE</td>
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<td>9</td>
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NOTE

(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

DIMENSIONS

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<th>Nominal Size</th>
<th>d</th>
<th>H</th>
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<th>K</th>
<th>M</th>
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Unit: inch

type 1500 carbon steel 3-piece type ball valves
Steel Ball Valves

AWSC3THZM
CODE NO. 317S

MATERIAL LIST

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<th>No.</th>
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<tr>
<td>2</td>
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NOTE
(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

DIMENSIONS

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Unit: inch

Note: All valves have an anti-static thrust washer insuring positive conductivity between body and stem.
Steel Ball Valves

AWSC3THZM
CODE NO. 317S

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<tr>
<th>No.</th>
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NOTE
(1) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

DIMENSIONS

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<thead>
<tr>
<th>Nominal Size</th>
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<th>D1</th>
<th>L</th>
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<th>F</th>
<th>K</th>
<th>G</th>
<th>J</th>
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Steel Ball Valves

AWSC3TFZM-7SO
CODE NO. 319FS-LOH

MATERIAL LIST

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<th>Materials</th>
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<td>CAP</td>
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<td>STEM</td>
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</tr>
<tr>
<td>A</td>
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NOTE

(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

DIMENSIONS

| Nominal Size | d | H | D1 | L  | d1 | P | A  | B  | C  | E  | F  | G  | J  | h  | K  | M  | ISO 5211 Flange Type |
|--------------|---|---|----|----|----|---|----|----|----|----|----|----|----|----|----|--------------------|
| 1/16         | 0.39 | 2.48 | 3.94 | 2.48 | 0.56 | 0.38 | 1.04 | 0.08 | 0.41 | —  | —  | 1.97 | 1/4-20UNC | 0.28 | M8 | 0.20 | —                |
| 1/8          | 0.39 | 2.48 | 3.94 | 2.48 | 0.69 | 0.38 | 1.04 | 0.08 | 0.41 | —  | —  | 1.97 | 1/4-20UNC | 0.28 | M8 | 0.20 | —                |
| 1/4          | 0.55 | 3.07 | 5.12 | 2.80 | 0.86 | 0.38 | 1.38 | 0.17 | 0.56 | 0.98 | 0.12 | 1.42 | 1/4-20UNC | 0.20 | M10 | 0.24 | F03              |
| 3/16         | 0.75 | 3.43 | 5.12 | 3.54 | 1.07 | 0.50 | 1.69 | 0.20 | 0.67 | 1.18 | 0.12 | 1.65 | 1/4-20UNC | 0.32 | M12 | 0.34 | F04              |

Unit: inch
Steel Ball Valves

AWSC3TFZM-FS

CODE NO. 319FS

BODY
CAP
STEM
BALL
GLAND
GLAND PACKING
SPACER PACKING
HANDLE
HANDLE NUT
WASHER
NAME PLATE
GASKET
BALL SEAT
GLAND NUT
CAP BOLT
LOCK PLATE
CONED DISC SPRINGS
THRUST WASHER
STOPPER PIN
LATCH LOCK

A216 Gr. WCB
A216 Gr. WCB
A276 TYPE 316
A276 TYPE 316 or A351 Gr. CF8M
A276 TYPE 316
FLEXIBLE GRAPHITE
G/F PTFE
A276 TYPE 430 (1)
A194 Gr. 8
STAINLESS STEEL
STAINLESS STEEL
FLEXIBLE GRAPHITE
HYPATITE PTFE
A194 Gr. 8
A193 Gr. B8
STAINLESS STEEL
STAINLESS STEEL
25% CARBON FILLED PTFE (2)
A276 TYPE 304
STAINLESS STEEL

NOTE
(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

MATERIAL LIST

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<th>No.</th>
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DIMENSIONS

| Nominal Size | d   | H   | D1  | L   | d1  | P   | A   | B   | C   | E   | F   | G   | J   | h   | K   | M   | ISO 5211 Flange Type |
|--------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------------------|
| 1/4          | 0.94| 3.23| 5.91| 4.06| 1.33| 0.50| 1.73| 0.53| 1.08| 1.18| 0.12| 1.65| 1/4-20UNC | 0.32| M14 | 0.39 | F04                 |
| 1/2          | 1.18| 3.46| 5.91| 4.33| 1.68| 0.50| 1.95| 0.53| 1.07| 1.18| 0.12| 1.65| 1/4-20UNC | 0.32| M14 | 0.39 | F04                 |
| 3/4          | 1.50| 4.09| 7.09| 5.50| 2.24| 0.46| 1.14| 1.14| 1.38| 1.20| 0.12| 1.97| 1/2-20UNC | 0.39| M16 | 0.39 | F05                 |

Unit : inch
Steel Ball Valves

AWSC3TFZM-FS
CODE NO. 319FS

MATERIAL LIST

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NOTE
(1) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.
(2) Stainless foil inserted flexible graphite.

DIMENSIONS

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<th>Nominal Size</th>
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<th>A (inch)</th>
<th>B (inch)</th>
<th>C (inch)</th>
<th>E (inch)</th>
<th>F (inch)</th>
<th>K (inch)</th>
<th>G (inch)</th>
<th>J (inch)</th>
<th>h (inch)</th>
<th>M (inch)</th>
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Steel Ball Valves

**AWSC3THZM-FSO**
**CODE NO. 319S-LOH**

**MATERIAL LIST**

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<th>Name of Parts</th>
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<td>CAP</td>
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<td>3</td>
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**NOTE**

(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.
Steel Ball Valves

AWS3THZM-FS
CODE NO. 319S

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<tr>
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NOTE

(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

DIMENSIONS

| Nominal Size | in. | d | D1 | L | d1 | P | A  | B  | C  | E  | F  | G  | J  | h  | K  | M  | ISO 5211 Flange Type |
|--------------|-----|---|----|---|----|---|----|----|----|----|----|----|----|----|----|-------------------|
| 1/4          | 0.94| 3.23| 5.91| 4.06| 1.68| 0.50| 1.73| 0.53| 1.08| 1.18| 0.12| 1.65| 1/4-20UNC| 0.32| M14 | 0.39 | F04               |
| 1/2          | 1.18| 3.46| 5.91| 4.33| 1.92| 0.50| 1.95| 0.53| 1.07| 1.18| 0.12| 1.65| 1/4-20UNC| 0.32| M14 | 0.39 | F04               |
| 2            | 1.50| 4.09| 7.09| 5.00| 2.41| 0.63| 2.24| 0.46| 1.14| 1.38| 0.12| 1.97| 1/4-20UNC| 0.39| M16 | 0.39 | F05               |
Steel Ball Valves

AWSC3THZM-FS
CODE NO. 319S

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NOTE
(1) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.
(2) Stainless foil inserted flexible graphite.

DIMENSIONS

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Steel Ball Valves

AWU3TFZM-O
CODE NO. 327FS-LOH

MATERIAL LIST

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<th>Name of Parts</th>
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NOTE
(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

DIMENSIONS

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Unit: inch

123 type 1500 stainless steel 3-piece type ball valves
**MATERIAL LIST**

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**NOTE**

(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

**DIMENSIONS**

| Nominal Size | d   | H   | D1  | L   | d1  | P   | A   | B   | C   | E   | F   | G   | J   | h   | K   | M   | ISO 5211 Flange Type |
|--------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------------|
| in.          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |    |              |
| 1            | 0.94| 3.23| 5.91| 4.06| 1.33| 0.50| 1.73| 0.53| 1.08| 1.18| 0.12| 1.65| 1/4-20UNC| 0.32| M14| 0.39| F04           |
| 1 1/4        | 1.18| 3.46| 5.91| 4.33| 1.68| 0.50| 1.95| 0.53| 1.07| 1.18| 0.12| 1.65| 1/4-20UNC| 0.32| M14| 0.39| F04           |
| 1 1/2        | 1.50| 4.09| 7.09| 5.00| 2.24| 0.46| 1.14| 1.38| 0.12| 1.97| 1/4-20UNC| 0.39| M16| 0.39| F05           |

- **Units**: inch
Steel Ball Valves

AWU3TFZM
CODE NO. 327FS

MATERIAL LIST

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NOTE
(1) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.
Steel Ball Valves

AWU3TFZM-FSO
CODE NO. 329FS-LOH

MATERIAL LIST

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NOTE

(1) Plastic covering.

(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

DIMENSIONS

| Nominal Size | in. | d   | H   | D1  | L   | d1  | P   | A   | B   | C   | E   | F   | G   | J   | h   | K   | M   | ISO 5211 Flange Type |
|--------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------------------|
| 1/4          |     | 0.39| 2.48| 3.94| 2.48| 0.56| 0.38| 1.04| 0.08| 0.41| —   | —   | 1.97| 1/4-20UNC | 0.28| M8  | 0.20                |
| 1/2          |     | 0.39| 2.48| 3.94| 2.48| 0.69| 0.38| 1.04| 0.08| 0.41| —   | —   | 1.97| 1/4-20UNC | 0.28| M8  | 0.20                |
| 3/4          |     | 0.55| 3.07| 5.12| 2.80| 0.86| 0.38| 1.38| 0.17| 0.56| 0.98| 0.12| 1.42| 1/4-20UNC | 0.20| M10 | 0.24                |
| 1            |     | 0.75| 3.43| 5.12| 3.54| 1.07| 0.50| 1.69| 0.20| 0.67| 1.18| 0.12| 1.65| 1/4-20UNC | 0.32| M12 | 0.34                |

Unit : inch

Welding End

Mounting Dimensions for Actuator

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type 1500 stainless steel 3-piece type ball valves
Steel Ball Valves

AWU3TFZM-FS
CODE NO. 329FS

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<td>A</td>
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NOTE

(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.
Steel Ball Valves

AWU3TFZM-FS
CODE NO. 329FS

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<td>STOPPER PIN</td>
<td>STAINLESS STEEL</td>
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NOTE

(1) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.
(2) Stainless foil inserted flexible graphite.

DIMENSIONS

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<th>L</th>
<th>d1</th>
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<th>C</th>
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<th>G</th>
<th>J</th>
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<th>M</th>
<th>ISO 5211 Flange Type</th>
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Type 1000 Stainless Steel 3-Piece Type Ball Valves
**MATERIAL LIST**

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<th>Name of Parts</th>
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**NOTE**

(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

---

**DIMENSIONS**

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Steel Ball Valves

AWU3THZM
CODE NO. 327S

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NOTE
(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

DIMENSIONS

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type 1500 stainless steel 3-piece type ball valves
Steel Ball Valves

AWU3THZM
CODE NO. 327S

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NOTE
(1) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.

DIMENSIONS

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Steel Ball Valves

AWU3THZM-FSO
CODE NO. 329S-LOH

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NOTE

(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.
Steel Ball Valves

AWU3THZM-FS
CODE NO. 329S

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NOTE

(1) Plastic covering.
(2) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.
Steel Ball Valves

AWU3THZM-FS
CODE NO. 329S

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NOTE

(1) All valves have an anti-static thrust washer insuring positive conductivity between body and stem.
(2) Stainless foil inserted flexible graphite.

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UNIT: inch

DIMENSIONS: Nominal Size

Mounting Dimensions for Actuator: ISO 5211 Flange Type
### Dimensions of ISO 5211 Actuator Mounting Pad

#### for Class 150 / 300 Full Port, Split Body, Side Entry Design Ball Valves

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*KITZ product codes:
(1) 150UTDZM  (4) 300SDTZM
(2) 150SCTDZM  (5) 300UTDZM

**Note:**
- Dimensions of stem head are in accordance with CAPI ADDS 2.02, but the maximum specified dimension in CAPI ADDS 2.02 is "F14".
- For NPS 8 and 10, mounting pads are F16/ISO 5211.
**KITZ** product codes:
150SCTAM(C)  
150UTAM(C)  
300SCTAM(C)  
300UTAM(C)

**Dimensions of ISO 5211 Actuator Mounting Pad**  
for Class 150 / 300 Single Reduced Bore, Uni-body, End Entry Design Ball Valves

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*These dimensions are specified as F03S by CAPI.

- Technical Information
### Dimensions of ISO 5211 Actuator Mounting Pad
for Class 150 / 300 Single Reduced Bore, Uni-body, End Entry Design Ball Valves

**Technical Information**

**Dimensions of ISO 5211 Actuator Mounting Pad**

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*KITZ product codes:
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150UTAM(C)
300SCTAM(C)
300UTAM(C)
Steel Pipe Flanges

ASME B16.5-1996
Class 150 RF, Class 300 RF

Class 150 steel pipe flange dimensions

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Height of raised face is 0.06 inch each. Dimensions in ( ) are for valve flanges.

Class 300 steel pipe flange dimensions

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Height of raised face is 0.06 inch each.
## Construction and Materials

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*1. A352 low-temperature service materials are optionally available.

*2. CF8 or Type 304 is optionally available for balls & stems.

*3. Bar type handles are used for 6” Class 150 / 4” and 6” Class 300.

All part numbers are corresponding with those shown in valve assembly drawings.

---

### Standard Material Configuration

- Standard material configuration can be applied to sour service.

---

*Figures and diagrams are not included in this text.*
All part numbers are corresponding with those shown in valve assembly drawings.

1. Bar type handles are used for 6” Class 150 / 4” and 6” Class 300.
2. CF8 or Type 304 is optionally available for balls & stems.
3. A352 low-temperature service materials are optionally available.
4. This part is used only for super-/firesafe provision.

Standard material configuration can be applied to sour service.

---

*1. A352 low-temperature service materials are optionally available.
*2. CF8 or Type 304 is optionally available for balls & stems.
*3. Bar type handles are used for 6” and larger.
*4. This part is used only for super-/firesafe provision.

All part numbers are corresponding with those shown in valve assembly drawings.
## Construction and Materials

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*1. Other stainless steels are optionally available.
*2. Bar type handles are used for 6” Class 150 / 4” and 6” Class 300.

All part numbers are corresponding with those shown in valve assembly drawings.

---

![Diagram of Steel Ball Valve Components](image-url)
1. Other stainless steels are optionally available.
2. Bar type handles are used for 6” Class 150 / 4” and 6” Class 300.
### Construction and Materials

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</table>

*1. A350 low-temperature service materials are optionally available.
*2. Type 304 is optionally available for balls and stems.
*3. These parts are used only for super-fireshase provision.

All part numbers are corresponding with those shown in valve assembly drawings.

Standard material configuration can be applied to sour service.
<table>
<thead>
<tr>
<th>No.</th>
<th>Parts</th>
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</table>

*1. These parts are used only for super-firesafe provision.
*2. Other stainless steel are optionally available.
All part numbers are corresponding with those shown in valve assembly drawings.

Standard material configuration can be applied to sour service.
# Construction and Materials

<table>
<thead>
<tr>
<th>No.</th>
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</tbody>
</table>

*1 A352 low-temperature service materials are optionally available.
*2 Type 304 is optionally available for balls and stems.
*3 These parts are used only for super-firesafe provision.

All part numbers are corresponding with those shown in valve assembly drawings.

---

### Standard material configuration can be applied to sour service.

- PTFE
- FLEXIBLE GRAPHITE
- SPIRAL WOUND
- NBR
- CARBON STEEL
- ALLOY STEEL
- STAINLESS STEEL
## Construction and Materials

<table>
<thead>
<tr>
<th>No.</th>
<th>Parts</th>
<th>Standard</th>
<th>Super-firesafe</th>
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</tbody>
</table>

*1. These parts are used only for super-firesafe provision.
*2. Other stainless steel are optionally available.
All part numbers are corresponding with those shown in valve assembly drawings.

Standard material configuration can be applied to sour service.
KITZ HYPATITE® ball seats are made of denatured PTFE, a molecularly reinforced PTFE / PFA copolymer, and specifically engineered for high sealing performance and prolonged service life of valves, in place of conventional glass-filled PTFE seats. The unique performance features are compared with those of conventional glass-filled or virgin PTFE ball seats below. With the introduction of HYPATITE® ball seats, glass-filled PTFE version is no longer available from KITZ Corporation, while carbon-filled or virgin PTFE seats remain available as options.

A newly developed option, KITZ SWELLESS® ball seats, principally made of PFA are recommended specifically for monomer service. This epoch-making new seat maximizes resistance to the permeation of monomer into its molecular structure (generally known as “swelling”) which causes seat deformation and seriously affects shut-off of valves in styrene and butadiene monomer service.

Our HYPATITE® ball seats also out perform conventional PTFE seats with its monomer resistance feature. However, it has been verified both by laboratory and on-site tests that SWELLESS® seats perform much better than HYPATITE® seats, as they indeed deserve the name of "SWELLESS", their registered trade name. Also, PFA resin, the principal material, assures the characteristic of fluorine resin such as excellent resistance characteristics to high or low temperatures, creep or compression, abrasion and general chemicals.

Table 1 and Figure 1, 2 and 3 here explain these technical features of HYPATITE® and SWELLESS® ball seats compared with conventional seat materials. For compared pressure-temperature ratings, refer to Page 13 and 14.

<table>
<thead>
<tr>
<th>Compared features</th>
<th>HYPATITE® or SWELLESS® seats</th>
<th>PTFE seats</th>
<th>Glass-filled PTFE seats</th>
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<tr>
<td>Creep and compression resistance</td>
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<tr>
<td>Chemical resistance*</td>
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<td>Good</td>
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</table>

* Refer to the above body text for monomer service characteristics of SWELLESS® seats.
KITZ HYPATITE® ball seats are made of denatured PTFE, a molecularly reinforced PTFE / PFA copolymer, and specifically engineered for high sealing performance and prolonged service life of valves, in place of conventional glass-filled PTFE seats. The unique performance features are compared with those of conventional glass-filled or virgin PTFE ball seats below. With the introduction of HYPATITE® ball seats, glass-filled PTFE version is no longer available from KITZ Corporation, while carbon-filled or virgin PTFE seats remain available as options.

A newly developed option, KITZ SWELLESS® ball seats, principally made of PFA are recommended specifically for monomer service. This epoch-making new seat maximizes resistance to the permeation of monomer into its molecular structure (generally known as “swelling”) which causes seat deformation and seriously affects shut-off of valves in styrene and butadiene monomer service. Our HYPATITE® ball seats also outperform conventional PTFE seats with its monomer resistance feature. However, it has been verified both by laboratory and on-site tests that SWELLESS® seats perform much better than HYPATITE® seats, as they indeed deserve the name of “SWELLESS”, their registered trade name. Also, PFA resin, the principal material, assures the characteristic of fluorine resin such as excellent resistance characteristics to high or low temperatures, creep or compression, abrasion and general chemicals.

Table 1 and Figure 1, 2 and 3 here explain these technical features of HYPATITE® and SWELLESS® ball seats compared with conventional seat materials. For compared pressure-temperature ratings, refer to Page 13 and 14.

Table 1. Compared Technical Features of KITZ Ball Seats

<table>
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<th>Feature</th>
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<td>Creep and compression resistance</td>
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<td>Abrasion resistance</td>
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<td>Throttling service</td>
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<td>Product contamination</td>
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</table>

Refer to the above body text for monomer service characteristics of SWELLESS® seats.

This data shows the results of some of the tests carried out at our laboratory under the specific test conditions introduced here. Variation in the type of test media, the phase of test media (gaseous or liquid), preparation of test specimen and test conditions such as pressure, temperature and duration, may cause the test results to be different from this data, but general monomer resistance levels of the seats introduced here are comparatively as exhibited in this test data.
Fire Test Standards

1. Introduction

Plant fires have become an increasingly serious concern due to the installation of a greater number of soft-seated ball and butterfly valves in place of conventional metal-seated gate and globe valves at many refineries and petrochemical plants. Extremely high temperatures usually result in decomposition or deterioration of resilient or non-metallic sealing components such as seats, gland packing rings, O-rings and gaskets, causing leakage of line fluid which, in turn, increases the magnitude of plant fires.

To minimize the extent of damage in such a mishap, soft-seated valves are expected to have the provision for secondary metal-to-metal sealing functions to minimize external and internal (through-the-bore) leakages as well as the provision for undisturbed valve operation during or after the fire enabling emergency shut-off or release of line fluid.

Soft-seated valves can be manufactured to meet such critical fire safety requirements, when designed adequately, machined and assembled correctly, and equipped with proper sealing components. Valves designed and manufactured in such a way may be called “firesafe valves”. Manufacturers’ claims of fire safety, however, remain subjective.

To verify the firesafe performance capability, the valve must be subjected to simulated plant fire conditions. API and BSI have developed technical specifications for such destructive tests, which are generally known as fire test standards. Fire tests are destructive and cost a lot to carry out due to high test expenses and bills for a third party’s certification, let alone the cost of destroyed samples. Such high costs eventually prohibit repetition of fire tests. To minimize the frequency of fire tests, all existing fire test standards allow a certain range of sizes and pressure classes be used in the tests. The test samples are generally known as prototype tests of the valve with a size and class rating selected by the manufacturer under pre-determined test conditions. Here it is noted that leakages under other test conditions may be substantially different. Fire test standards are prepared for just a range of sizes of valves having the same pressure rating, design details and material composition. A test report prepared by BSI for fire test conducted on KITZ ball valves mentioned that the “report only relates to the actual ball valves which were tested and not to any given time. As already mentioned, the fire test is a kind of destructive test (unlike the pressure test conducted for normal valve performance evaluation) and cost a lot to carry out due to high test expenses and bills for a third party’s certification, let alone the cost of destroyed samples. Such high costs eventually prohibit repetition of fire tests. To minimize the frequency of fire tests, all existing fire test standards allow a certain range of sizes and pressure classes be qualified and certified without actual test being carried out, given that valves are designed the same and their non-metallic sealing materials are considered same as the actually tested valve.

2. History

BS 6755, Part 2 (**) was issued to introduce, in a different form of presentation, the technical contents of API 6FA (**), and API 607 (**), with the intention of replacing the requirements of BS 5146, Part 1, Appendix A.1 (**). Until this new British Standard was issued, technical differences between British Standard and API Standards resulted in high costs to valve manufacturers who desired to certify their products to these standard, and caused confusion amongst contractors and end-users in their evaluation of the products to be purchased.

Even within the United States, valve manufacturers, contractors and end-users had similar difficulties because of different fire test requirements which existed between API Production Department (which is now responsible for API 6FA) and API Refining Department (which has been responsible for API 607).

Following the virtual unification of fire test requirements by API Production and Refining Departments in their latest 1985 issues, BSI finally launched a major program to adopt American standards as their own, which shall eventually help realize a globally unified fire test standard through ISO.

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*1 “Testing of valves: Specification for fire type-testing requirements”.
*2 “Specification for fire test for valves”.
*3 “Fire test for soft-seated quarter-turn valves”.
*4 “Inspection and test of valves: Specification for steel valves for the petroleum, petrochemical and allied industries: Fire safe testing of soft seated ball valves”.


3. Objective of Standardization

As highlighted by all of these standards, the fire test standard is prepared to establish test requirements which cover test procedures, performance requirements or evaluation criteria, product qualification and test certification, for the objective of technical evaluation of pressure containing capability of valves exposed to pre-determined, simulated fire conditions.

Here, the performance requirements are intended to establish limits of acceptability of valves regardless of size, nominal pressure or class rating. The burn period, or test duration, is decided on the basis that it represents the maximum time required to extinguish most plant fires. Fires of longer duration than specified in the standards shall be, therefore, considered to be of a major magnitude with consequences, or damage, greater than those anticipated in the fire tests.

For this reason, requirements for more or less stringent testing may be negotiated and established by the valve manufacturer and its customer to meet the customer’s specific service applications.

4. Evaluation of Test Results

The maximum allowable leakage rates in these standards are determined for the defined test temperature, pressure and duration. Here it is noted that leakages under other test conditions may be substantially different. Fire test standards are prepared for just a prototype test of the valve with a size and class rating selected by the manufacturer under pre-determined test conditions assumingly representing typical plant fire conditions. This can be translated to mean that test reports certified to any of these fire test standards do not necessarily verify satisfactory performance of the valves that users may purchase from the manufacturer at any given time. As already mentioned, the fire test is a kind of destructive test (unlike the pressure test conducted for normal valve shipments), and no one would be willing to purchase such destructively tested valves in a commercial transaction.

It is specifically mentioned in BS 5146, Appendix A.1 that the “test is intended only as a prototype test and is intended to cover a range of sizes of valves having the same pressure rating, design details and material composition”. A test report prepared by BSI for the fire test conducted on KITZ ball valves mentioned that the “report only relates to the actual ball valves which were tested and assessed. The results obtained therefore do not necessarily relate to samples from the production line and in no way imply the performance or quality of the continuing production.”

The range of sizes and pressure classes to be automatically qualified by a prototype test of a valve of a certain size and rating is introduced here. Also it should be noted that potential leakage from pipe-to-valve end connection joint (either flanged, threaded or welded) cannot be evaluated by these standards, and not included in the allowable external leakages specified. API Production Department issued a standard API Bulletin 6F1 (**), for performance evaluation of such valve end connections exposed to the fire.

*5 Bulletin on Performance of API and ASME End Connections in a Fire Test According to API Specification 6FA.
General Precautions for Trouble-free Operation of Soft-seated Ball Valves

1. Excessive Cavity Pressure

Refer to Page 6. Very important

2. High-Temperature and High-Pressure Service

The pressure-temperature ratings published by manufacturers are usually considered an appropriate guide to the maximum temperature and pressure that such ball valves may withstand. KITZ recommends, however, reference to the valve distributor or manufacturer for an assurance of suitability when ball valves are to be subjected to the following conditions:

a: Floating ball valves are left closed for a long period of time under high temperature or high differential pressure.
b: Floating ball valves are operated frequently for long periods of time under high temperature or high differential pressure.
c: Floating ball valves are subjected to frequent change of the line pressure or service temperature.

3. Liquids with High Velocity

When ball valves must be operated frequently on liquids with very high velocity, a check should be made with the valve distributor or manufacturer for appropriate advice to minimize the possibility of seat deformation, especially when they are highly pressurized on high-temperature lines.

4. Valve Selection

Be sure to select a valve with design specifications that meet the pressure and temperature conditions required. Take special care to select the valve to be used for fluids containing abrasives, since the high molecular materials employed in the seats could suffer degradation.

5. Valve Installation

Before installing the valve, the pipe bore should be checked to confirm that no weld spatter, scale or rust particles remain inside. For mounting flanged valves, diagonally located flange bolts should be tightened evenly.

6. Degree of Valve Opening

Soft seated ball valves should be considered as ON / OFF valves only and care should be taken to ensure that they are fully closed or open. Opening ball valves partially can result in seat erosion and cause seat leakage. Pipelines that require the use of ball valves for throttling service should be designed in consideration of the amount of the seat leakage which may occur in its fully closed position. Note that ball valves should be stored in a fully open position.

7. Valve Actuation

Two types of pneumatic valve actuator KITZ B-Series and FA-Series are available for our factory mounting. Also KITZ “KELMO” electric actuators are available. Electric actuators or pneumatic actuators of any other specified brand is also available for mounting.

If a user mounts its own actuators on KITZ ball valves, however, all users are recommended to contact KITZ or its authorized distributors for adequate technical advice, because any improper sizing of actuators may cause serious problems in the field. It must be noted that the actual value of the operating torque of any given valve may vary, depending on the service conditions listed below:

(1) Fluid
   a. Kind of fluid
   b. Line pressure
   c. Line temperature
   d. Fluid volume
(2) Ambient temperature
(3) Opening / closing degree
(4) Type of actuator
(5) Frequency and pattern of change of line pressure
(6) Frequency and pattern of change of line and ambient temperatures

8. Valve Disassembly

The line fluid should be completely removed from the internal of the valves before they are removed from the pipeline for maintenance. Even after the line fluid has been discharged through the pipeline, some fluid is always trapped inside the body and body cavity (the area surrounded by the body, ball and two seats). Be sure to completely discharge the pressure trapped in the body cavity, before valve disassembly.

Inspection and Warranty

Each KITZ ball valve is subjected to 100% in-house inspection designated by API 598 or BS 6755 Part 1. This includes hydrostatic shell tests and pneumatic low-pressure seat test. Manufacturer’s material certificates and test reports are available upon request. Each KITZ ball valve is guaranteed for 12 months after placement in service, but not exceeding 18 months after shipment from KITZ factories.
Flow Characteristics

One of the biggest advantages of ball valves versus other types is that the flow through them is greater for the same bore size. Fluid is disturbed less by turbulence or pulsation. To determine the flow rate through a valve at a specific opening, multiply the flow rate (Flow rate(\%)) given in the curve to the right by the pressure loss given below.

**Pressure Loss vs. Flow Rate**

**Full port valves**

<table>
<thead>
<tr>
<th>Flow in gallons per minute (gpm)</th>
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<th>10000</th>
<th>100000</th>
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<tr>
<td>Pressure loss (psig)</td>
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**Reduced port valves**

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<td>Pressure loss (psig)</td>
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**Schedule 40 steel pipe (10m)**

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<tr>
<td>Pressure loss (psig)</td>
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Valve opening vs flow rate
Class 600 RF

Class 600 steel pipe flange dimensions

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<th>t</th>
<th>h (Bolt hole)</th>
<th>Bolt</th>
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<td>in.</td>
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Height of raised face is 0.25 inch each.
### Class 1500 steel pipe flange dimensions

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Height of raised face is 0.25 inch each.

![Class 600 to 1500](diagram1)

![Class 150, 300](diagram2)
# Steel Pipe Flanges

**ASME 16.47-1996 (Series A)**

## Class 150 steel pipe flange dimensions

<table>
<thead>
<tr>
<th>Nominal Size inches</th>
<th>D in.</th>
<th>C in.</th>
<th>g in.</th>
<th>t in.</th>
<th>h (Bolt hole) in.</th>
<th>Bolt Number Diam.</th>
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Height of raised face is 0.06 inch each.

## Class 300 steel pipe flange dimensions

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<th>Nominal Size inches</th>
<th>D in.</th>
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<th>g in.</th>
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<th>h (Bolt hole) in.</th>
<th>Bolt Number Diam.</th>
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Height of raised face is 0.06 inch each.

## Class 600 steel pipe flange dimensions

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Height of raised face is 0.25 inch each.
### Steel Pipe Flanges

#### Class 150 steel pipe / flange dimensions

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#### Class 300 steel pipe / flange dimensions

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#### Class 600 steel pipe / flange dimensions

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</table>
CAUTION

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